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ABSTRACT

Presented are a series of papers in which Mr. William C. Norris, Chairman and Chief Executive Officer of Control Data Corporation, explores ways in which technology can be employed to solve many of society's problems. Papers included are: Technological Cooperation for Survival: Via Technology to a New Era in Education; A Policy for Export of Products and Technology; Technology and Full Employment; Back to the Countryside Via Technology; Harnessing Technology for Better Urban Living; Technology for Improving the Image of Business; and Technology for The Inner City--Experience and Promise. (RAO)

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TECHNOLOGY: OUR TIRELESS SERVANT

A Series of Booklets

by

William C. Norris

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Technological Cooperation For Survival

William C. Norris
Chairman and Chief Executive Officer
Control Data Corporation

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Technological Cooperation for Survival, given to the Institution of Electrical Engineers, London, England, on February 25, 1977.

#1

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There are two inter-related ideas that I would like to discuss with you today. I consider these ideas to be extremely important – not only for me and my company, but also for you and the rest of the world.

The ideas are these: first, considering the urgency of today's world problems it is economically wrong to squander our technological resources as we are doing; and second, there are practical, readily available means to make greater use of technology to attack these problems now, before they grow to disastrous proportions.

"...technological innovation is the well-spring of new jobs, and solutions to these major problems will provide the jobs that society so badly needs."

We have to start from a realization that the wheel is being reinvented every day throughout the industrial world, while vast amounts of existing technologies are under-utilized. This enormous waste of technical resources is a major reason why the world is lagging in the achievement of more abundant energy sources, improved energy conservation, new materials, greater environmental protection, increased food production, more efficient water conservation, better health care, more efficient education, improved productivity and solutions to many other pressing problems of society.

Additionally, technological innovation is the well-spring of new jobs, and solutions to these major problems will provide the jobs that society so badly needs. The dilemma is that this requires massive technological resources – far more than any single country can marshal.

It seems obvious, therefore, that we need to minimize unproductive duplication and to share the resulting benefits through worldwide pooling of technological effort at all levels.

This is no utopian dream. Many of the techniques have been proven in practice, but there are difficulties, both real and imagined. I'll try to highlight some of the major hindrances involved, review some successful cooperative programs and make specific suggestions for achieving widespread cooperation.

SOURCES OF TECHNOLOGY

One of the great untapped resources of the world is the wealth of information and technology buried in the libraries and laboratories of businesses, government, research institutes, academic institutions and individual inventors. But this asset isn't being used effectively because its transfer between industries, from government to business and among small and large businesses, is so inefficient. Yet official studies show that most major innovations result from application of

technologies developed in one industry to the solution of problems in another. (These studies also show that small companies are better innovators in many areas than large companies.)

Methods for substantial improvement, both in efficiency of transfer and minimization of duplication, include (1) an efficient mechanism for communicating the availability of, and the needs for, technologies, and (2) financial incentives to spur sharing of technology.

EFFICIENT MECHANISM

Efficient transfer of technology demands human-to-human communication, questioning and explanation. Unfortunately, however, the amount of available technology is both massive and totally disordered. As a result, communication between those with available technology and those who need it occurs only with incredible difficulty.

"... a more efficient mechanism to overcome the communications problem is now available..."

A more efficient mechanism to overcome the communications problem is now available in Control Data's worldwide computer-based technology exchange service. For a modest fee buyers and sellers of technology can match their needs. The problem of disorder is solved in the simplest possible way: technology is decribed by its owner in terms of *not* of what it is, but of what it can *do*. Correspondingly, searchers describe what they want to do, not what they think the technology should be.

NEED FOR COOPERATION

There is a growing – but still limited – recognition of the need for increased cooperation. This is evidenced by your collaboration here in Europe in aerospace, weather and nuclear fields. Then there are the Government-to-Government agreements for cooperation in various fields of science and technology.

But the number and scope of cooperative programs are much too small to solve the urgent problems of our society in a timely fashion.

Energy: A brief look at just one of these needs – new energy sources – will provide some perspective on the gap between the present effort and the pressing need. Unfortunately, it is virtually impossible for the average person, including politicians, to perceive the need for vastly increased research and development, and, in turn, widespread cooperation, to develop new sources of energy when petroleum products are generally available, albeit at prices that are causing economic disrup-

tions in most western countries. It is easier, as some people do, to blame the higher cost of petroleum products on failures of large companies and inept governments to act in the public interest. Consequently the realities – articulated by a growing number of leading scientists, engineers and businessmen – that every possible source of energy must be investigated, are not being faced. This means that eight to ten different approaches will have to be pursued because we can't now foresee which ones will be successful. However, all will probably be needed in the long run.

It appears that the breeder reactor is the only development effort that is being funded adequately. It has high priority in the United States, Europe and Japan, however recently the United States has decided to stretch out its effort. Another reference point is that solar energy, up to now, has gotten only four percent of U.S. Government funding for energy research and development.

"... cooperation permits significant enlargement of research and development through more efficient use of resources, increasing the likelihood of a breakthrough."

Computer Industry: While the massive requirements for timely solutions to energy problems dramatically illustrate the urgent need for more cooperation, there are similar needs in many industries.

For example, in the computer industry no company has any product breakthrough advantages today, nor have there been any of significance for twenty years. Competitive success is gained mainly by doing a better job of solving the customer's problem with application software and professional services support, rather than by possession of superior hardware or basic software; and yet, the duplication in research and development in hardware and basic software is enormous. There is one significant exception, and that is the cooperative projects that Control Data is engaged in with several other computer companies, including ICL.

For industrial companies cooperation permits significant enlargement of research and development through more efficient use of resources, increasing the likelihood of a breakthrough. There is really no competitive disadvantage, as each partner is free to pursue the market in his own way, by concentrating on the unique application of the resulting products to its customers' problems.

This is not just theory – my company is experiencing the benefits of cooperation. It took us eight years to convince other companies to participate. The main stumbling block was concern over selling the same product in the marketplace. But this has proved to be unfounded.

BARRIERS

Another major concern is that of maintaining an exclusive proprietary position. In the past, companies have been able to develop new products with reasonable risk and affordable technical effort while providing an attractive return on investment. Examples in the past forty years are synthetic fibers, mending tape, instant photographs, xerography, transistors, integrated circuits and computers. For a number of reasons, neither outside technology nor cooperation has been particularly necessary to this past era of what might be termed "Proprietary Product Creation". Contributing factors in this past era were that technology was not equally advanced in all countries or as potentially available as it is today.

But circumstances are changing. First, many of the easiest things have been done. It is getting tougher to bring in new proprietary products – much more costly – more time-consuming – and much more risky. Consequently, industry has turned its attention more to product improvement and cost reduction. Therefore, concern for proprietary position now is rooted more in tradition than logic. There are reasons to want to protect proprietary elements of the marketing process but the time for it to be a major consideration in research and development has passed

There have been few significant breakthroughs in recent years, and even when there were, the new technology has diffused so rapidly that any initial business advantage was soon lost. Thus, companies in most industries are selling the same basic product. Differentiation is achieved by designing features to apply the product better and to support the customer better.

"Too many companies are victims of the 'Not Invented Here' syndrome..."

Too many companies are victims of the "Not Invented Here" syndrome, which causes them to reject innovations developed elsewhere. And this, when coupled with the normal arrogance of large organizations, is a huge barrier.

Within most large companies the natural impulse is to want to do everything from scratch. It is unnatural to seek help or even to recognize that help is needed.

Further, in the matter of cooperation between nations, the belief persists that it is so difficult to achieve the high degree of cooperation needed for successful transfer of technology from other countries that its attempt is hardly worthwhile, despite significant contrary experience. Japan's exceptionally rapid economic growth in the post-war period is evidence that technology can be imported successfully and make a significant contribution to improvement in a country's standard of living.

Now, it seems to me, the pressures of changing economic conditions, such as the tremendous rise in the risk and cost of R&D, will force more sharing of research costs, and the expanding research capabilities in a number of countries will increase the attractiveness of utilizing, on a shared basis, the research resources of and technologies developed by others.

FORMATS FOR COOPERATION

Patterns for cooperation, I believe, are well known. The simplest and by far the most widely used is a license agreement where the seller assists the buyer in making successful use of the technology. Others which are more appropriate for the future include joint projects, turnkey plants and joint ventures. A joint venture, which usually takes the form of a jointly owned company, is most appropriate when large capital investments are required.

"Not only are our cooperative activities with other companies in the computer industry rewarding, but virtually all of our technology has been made available for use in other industries."

How is a significant increase in cooperation to be achieved?

First, my advice for individual companies, is to try it – you'll like it.

The chief executive must exert strong leadership to achieve a cooperative mode, but of course, he first has to believe in it.

Control Data has learned that. Even at the project level the advantages of widescale cooperation are understood and practiced voluntarily primarily because the benefits have been experienced.

My company recently surveyed professional employee views on technology cooperation at the project level and found a deep conviction that it is highly advantageous. Our employees were able to identify no major disadvantages, and they believe strongly that more technology has come in Control Data's open door than went out.

As a result of our cooperative activities with other computer companies, substantial numbers of dollars have been saved. At the same time a better job has been done in developing new products. As a result of these savings, we have been able to make significantly increased investments in improved customer service. Technology cooperation is paying off handsomely for us.

Not only are our cooperative activities with other companies in the computer industry rewarding, but virtually all of our technology has been made available for use in other industries. While it is too early in this program to draw firm conclusions, there is evidence that Control Data will not only benefit from substantial added income, but that new

market opportunities for our standard products and services will be identified. Further, our professional staff is becoming more skilled and motivated as a result of the broader experience that is being afforded them in helping to transfer and apply our technology in other industries.

While there are differences between industries, I believe they are not so great as to preclude any other company from obtaining the same advantages from cooperation.

"Clearly governments should join together with private companies to pursue these projects."

High Investment/High Risk Projects: Expanded cooperation between industries make it feasible to undertake projects that require larger investments and entail risks too great for individual companies.

But in addition, there are important problems to be solved where investment or risks are beyond private industries' capability or do not provide them with an acceptable return on the investment. Here we must keep in mind that technology developed by one company or group of companies eventually has major benefits to the entire economy, and because of these extra benefits or "Social Dividends," support is warranted from society as a whole.

Normally the development of technology that is financed by private enterprise has a large enough payout and low enough risk so that an acceptable return on the investment in R&D is virtually assured even though a greater value is eventually realized by the rest of society. Usually, therefore, society gets from private business the products that meet that business test rather than those that address the more fundamental needs of society. Without government support, therefore, there will not be technology created to meet all of society's needs. Therein lies a major reason why private enterprise is not aggressively pursuing solutions to many of our most pressing problems.

A whole new round of innovation is necessary. The costs will be very high and the risks are great, both because of uncertain outcomes and unpredictable market reception.

Much of the initiative to establish these large-scale endeavors will have to come from the private sector. Governments seem to recognize the need for cooperation but have not shown much ability to act.

The diverse technologies created will most likely have far greater value to society than can be realized by the individual companies involved. Clearly governments should join together with private companies to pursue these projects. Management should come from the private sector and funds from the governments until experimental models can prove feasibility. Thereafter, the balance of the cost should be borne by industry.

The most experienced and effective management resides in the major business corporations of the world. They must provide the leadership – the initiative. For the very large, high-risk projects, this can best be done by a consortia of private companies and governments.

I believe that the major investment banking institutions should provide leadership in the formation of these consortia for large scale endeavors. These institutions have great credibility and they can readily cross national boundaries . . . they often sponsor mergers, and the promotion of cooperation is very similar. In the long run, the sponsorship of cooperation may be less of a departure from traditional pursuits than it now appears to be because recognition of the growing importance of technology will make it the coin of the realm.

"There is also the need to motivate those with technology to make it more available to those who need it."

Availability of Technology: There is also the need to motivate those with technology to make it more available to those who need it. Probably the simplest way is for governments to provide tax incentives. For example, tax-free sale of technology should appeal to all concerned. There wouldn't be additional cost to the taxpayer, for without the incentive the sale wouldn't take place. New jobs would be created and the profits from the resulting production would be taxable. Also, application of existing technology produces jobs sooner and at less cost than developing the same technology from scratch.

Small Companies: Tax incentives should also be provided to encourage large companies to increase cooperation with small companies. Only the large concerns can undertake technological innovations requiring large numbers of human and financial resources. On the other hand, a combination of the greater engineering, production, marketing and financial resources of the large company with the technology base and resourcefulness of a small one, stimulates innovation.

Universities: Universities and business need a closer working relationship in order for business to apply research more effectively. On the other hand, business should be providing more support for university research. This would occur if there were more directly identifiable, socially beneficial results from university research.

Universities should play the leading role in the assessment of environmental impact of new technologies early in the developmental process. The cost should be borne by government.

"There should also be increased technological cooperation between the West and the Soviet Union."

Soviet Union: There should also be increased technological cooperation between the West and the Soviet Union. The Soviet Union has more scientists and engineers at work than any other country and they are producing vast amounts of basic technology. They have not been effective enough in the application of technology in production. On the other hand, western countries emphasize the application of technology so there is the basis for a natural division of work in what can result in very productive cooperation.

Research projects now under way between the U.S. Government and the Soviet Union illustrate the point. One is the joint project in nuclear fusion. It was started in 1974 and is based on a breakthrough achieved by Soviet scientists. This significant cooperation has already been very beneficial to the U.S.

Another project is in magneto-hydrodynamics research. One immediate result was the saving of more than $100 million, through joint use of a Russian test facility.

Developing Countries: The greatest need for more technological cooperation is between the industrial and the developing nations. National and international organizations have been grappling with this issue for more than a decade. The OECD has given it major attention and provided valuable perspectives on problems and solutions.

One of the major impediments to progress is that much of the technology of the industrial nations does not fit the needs of developing countries. The challenge is both to transfer existing technology and to develop new technology that is more appropriate.

Most developing countries lack adequate technical and managerial resources to identify needs and to select and manage the implementation of proper technological solutions. In addition, although technology is pivotal in the economic development process, it has to be accompanied by capital and management and applied in a supportive environment. Unfortunately a proper environment and intra-structure conducive to technological innovation is also lacking in most developing countries, so progress is too slow.

Innovation is hampered in many places by the fact that there is little opportunity for innovators to participate in rewards or because of an environment that has little understanding of what the marketplace wants or will pay for.

Clearly the most effective and timely applications of technology in developing countries will require assistance by industrial nations, but wherever possible the assistance must be in the form of cooperation in which the developing countries also contribute in a meaningful way. In other words, the motivation for cooperation by the industrial nation

must be less an act of generosity and more that of seeking business opportunities.

The major method of implementation should be joint ventures. Small to medium sized Western industrial companies make the best partners in such joint ventures with the developing countries because they are the most flexible and the best innovators.

"... the motivation for cooperation by the industrial nation must be less an act of generosity and more that of seeking business opportunities."

There is a growing commonality in the problems of the developing and industrial countries in the areas of energy, agriculture, food processing, water conservation and health. These are all areas of great need and will provide mutually rewarding joint venture business opportunities. In addition, there are growing opportunities for universities in developing countries to make research contributions, particularly in the field of agriculture.

OTHER CONTROL DATA CORPORATION PROJECTS

There are several other Control Data programs to be mentioned for perspective on the considerable resources we are dedicating to the promotion of technological cooperation.

We sponsor seminars to provide greater awareness of important technologies. These seminars bring scientists and engineers from different countries face to face. The technologies they discuss can be indexed and stored in the TECHNOTEC data base, making them easily accessible for study during the seminar. Afterwards the technologies can be called out for examination any place in the world.

The first series of seminars was held in the United States earlier this year. They addressed Soviet technology in process control systems. The attendance was excellent and there were many cases of serious interest in the technologies.

Solar Technology: Another important Control Data program is a priority effort to collect in the TECHNOTEC data base all of the world's solar energy technology. While still inadequate and inefficiently organized, technical effort is increasing rapidly in this important field. There is a high degree of duplication of current R&D effort between countries and among companies commercializing solar technology.

Society cannot afford waste in this endeavor. With Control Data's program we expect that unwanted duplication can be largely eliminated and cooperative activities facilitated.

If any of the present owners of solar technology cannot now afford the normal fees for storing their technologies in the TECHNOTEC data

base, or if there is doubt that the program will achieve its objectives for one reason or another, Control Data will finance the submissions until budgets are available or the objectives are met. We see the need, the facility is available and now is the time to get on with meeting the need while time is still on our side.

"... the over-whelming pressures of the many urgent problems will force change in our methods sooner or later, but extraordinary effort will be required if it is going to happen sooner."

Appropriate Technology: Another Control Data program is that of recording technology appropriate to the needs of developing countries. Our plans are similar to those for solar energy. There have been many conferences on this subject over the past ten years. The leading industrial countries have all promised support, but there isn't much progress. There is an urgent need for developing countries to be able to know what is available.

Control Data's objective is to get a significant amount of appropriate technology in the TECHNOTEC data base as quickly as possible. Here again we will finance much of the cost of getting the technology into the data base in the initial stages – long enough to demonstrate the benefits. Subsequently, we expect the program to be self-supporting.

CONCLUSION

Let me conclude by noting that the background and suggestions outlined for widescale cooperation in this paper are necessarily sketchy. There are omissions and alternatives. My main objective is to highlight the need, to illustrate ways that cooperation can be achieved within our present business pattern and to stimulate serious thinking and actions.

Because it is certain that the present standard of living in the West cannot be maintained without large-scale technological cooperation, the overwhelming pressures of the many urgent problems will force change in our methods sooner or later, but extraordinary effort will be required if it is going to happen sooner.

The average public office holder doesn't want to risk advocating change – change is painful and risky and is resisted.

Most big businesses don't want to rock the boat; instead they prefer to keep doing more of the same – make the cars two inches shorter or two inches longer; put more fake walnut on the TV set or put new stripes on the tennis shoes. Big business is not disposed to share its technology and cooperate with small business.

"If widescale cooperation can be achieved sooner it may be possible not only to provide the needed jobs and maintain the present standard of living, but to improve our environment, health care, education and meet other pressing needs."

Most university professors don't want to change – they want financial support for research to do more of what they want to do instead of research in cooperation with businesses to meet the needs of society.

These remarks are not intended to single out particular segments of our society for criticism. We have a closely knit, interactive society and one part can't change much without changes in all parts.

If widescape cooperation can be achieved sooner, it may be possible not only to provide the needed jobs and maintain the present standard of living, but to improve our environment, health care, education and meet other pressing needs.

In my judgement, there is no acceptable alternative.

Via Technology to a New Era in Education

William C. Norris
Chairman and Chief Executive Officer
Control Data Corporation

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This article, reprinted from the Phi Delta Kappan Journal, is drawn from an address presented at the 1976 congress and exposition of the Society for Applied Learning Technology on July 22, 1976, in Washington, D. C.

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Without a doubt, the people of this nation know more today than any other people at any time in history. Yet there seems good reason to believe that the more we know the less we understand – that the greater and more complex and more pressing our national problems, the less we seem able to reach timely agreement on solutions. Take energy as an example. In spite of a desperate need for a national energy policy, our country continues to drift without one. Health care, unemployment, housing, or crime are equally valid examples.

Education, of course, has become another well-recognized national problem. Of all those I have named, it is the one about which there is the most reason for optimism.

The steady, steep rise in the cost of education – to the point of bankrupting one school administration after another – has received only fragmented efforts at solution. Indeed, fragmentation is at the very root of the cost problem in education, and can be blamed for the mounting quality complaints as well.

One manifestation is the horrendous duplication of effort, as each teacher continually reinvents the wheel in his or her own classroom. The prerogative of each teacher to decide what is best has resulted in only isolated applications of advanced technology in education. Very little has been accomplished in focusing subject matter, teaching experts, and technology on common objectives. Teachers are not solely to blame, because college presidents, boards of trustees, public school boards, and even communities all maintain their educational prerogatives and their outdated labor-intensive ways.

"... the number one need, after jobs, is higher-quality, more readily available education – at a lower cost."

But I believe it is increasingly evident that there is one segment in our society that can cut across these narrow, autocratic domains: private, competitive enterprise. Corporations must be, and I believe want to be, more concerned with meeting the needs of society; and the number one need, after jobs, is higher-quality, more readily available education – at a lower cost.

The most direct and effective way to get it is for private companies to provide the appropriate technologies, management, marketing, and leadership to glue together enough governmental and institutional support to provide a better alternative. The primary technological alternative is CBE, computer-based education, in a learning center network.

The past 30 years or so have produced a base of advancing technologies that have the power to revolutionize the quality, productivity, and availability of education.

The technologies to apply are the electronic ones – television, radio, audio and videotapes and discs, computers, computer conferencing,

cable TV, microwave and satellite transmissions, and of course CBE.

Some of those technologies have been applied individually – some with high success, others with less, but each contributing enough useful experience so that today we can begin to glimpse the education system of the future.

THE SYSTEM

The procedure seems clear. We must assemble and configure our several technologies into a system that does what the present educational process does, but does it with capital-intensive, productive technologies, rather than trying to drive still harder a labor-intensive process that can at best only stagger under the loads of higher needs, higher expectations, and higher and higher costs.

The type of system that looks most workable is basically a national and international network of learning centers. In the U.S., for example, there will be a number of independently owned networks – in some respects not unlike the TV networks of today. On a local basis, such as within Washington, D.C., this would probably include the use of cable television and microwave. On a national and international basis, satellite communication will be involved.

"A network will retail education to the user through learning centers or wholesale it to other educational institutions."

The system is computer-controlled and the main method of delivery is computer-aided instruction with integrated terminal subsystems which include videodiscs, audio input and output, and touch input. Structured computer conferences of up to 40 students can be held, or a single student can interact with another student or instructor as desired. The key to this system will be computer-aided and computer-managed instruction, but other types of media will be offered as appropriate.

The PLATO system of CBE is at first glance perceived as having several advantages: infinite patience, the epitome of personalization, nearly limitless versatility, and delivery of uniformly high quality. But it's much more than that. It's a knowledge, fact, information, and educational delivery system of the first order, using many media and structures. It offers the promise of profound and beneficial impact on the delivery and application of knowledge in ways that free us from the fetters of an educational process virtually unchanged from the days of its great namesake teacher, Plato.

It is applicable to an information-based or knowledge-based service involving exchange of facts and/or their modification. It can be used

one-to-one, like a telephone, or one-to-many, like radio or TV. But in addition many can interact with the one or interface with many others. With audio and visual, it is a communication system with a virtually inexhaustible memory and the ability to exercise agreed-upon logic. It is profound, transportable, lasting, dependable. It works 24 hours a day, seven days a week. It costs less and less each generation. And it can be consistently excellent.

"The most urgent need in industry today is productivity improvement. Employee training is the area with the most potential . . ."

HOW TO PROCEED

The learning center networks I spoke of will arise from the cooperative efforts of business, government, and educational institutions. Perhaps multinational companies will fashion and operate the networks. A network will "retail" education to the user through learning centers or "wholesale" it to other educational institutions.

A wide range of courseware will be offered. If you are not familiar with the term "courseware," you could think of it as curriculum materials in all media forms, including computer programs. The courseware must be of the highest quality. Cooperative efforts between the networks and either individual authors or author teams, as well as cooperative projects with educational institutions worldwide, will insure that quality is achieved. No one should underestimate the cost of high-quality courseware. The investment in individual courses will be up to $1 million or more for each network. Therefore the ability to deliver to a large segment of the population is necessary to insure a reasonable return on this investment.

COMPUTER ASSISTED INSTRUCTION (CAI) TIMETABLE

Training for Industry. The market entry point for the learning center network is to provide training for industry. The most urgent need in industry today is productive improvement. Employee training is the area with the most potential, and CAI has reached the stage of development where it is cost-effective for many types of employee training. One reason is that employee time in training is a definable cost to a company. CAI has demonstrated already that it saves time and improves learning. Additional savings will appear as the costs of components of advanced technology are reduced further by development. Within a few years, training will become available in many communities through portable terminals used in the home.

Expenditures for training in industry in the U.S. are estimated at $100 billion annually, which is about the same as the combined cost for primary, secondary, and college education. Thus there is a market

sufficient to support a national network of learning centers delivering training to industry. In fact, the Control Data Corporation already has a national network in operation with 26 centers, and more are planned.

Special Education. The next area where CAI will become cost-effective is in special education, which today is very costly. It is also highly frustrating and time-consuming for teachers. The individual testing, prescribing, feedback, record keeping, and analyzing – all done manually – require too much time, effort, and patience to be done effectively. The computer has infinite patience. It doesn't neglect any of those chores in favor of something more interesting. And it is private. The pacing factor in getting widespread usage is availability of courseware. But special education has a high priority with the U.S. government, and substantial resources are being committed to this area.

"The computer has infinite patience. It doesn't neglect any of those chores in favor of something more interesting. And it is private."

Vocational Training. CAI will become cost-effective for those areas of vocational training where simulation can replace hands-on experience within the next year or two. Examples are training for the maintenance of TV sets, instruments, computers, and many types of mechanical devices.

College. Use of CAI will become widespread in colleges over the next five years as costs of traditional education rise and CAI costs decrease. Department of Health, Education and Welfare figures show that traditional instruction costs have been increasing at an average compounded rate of about 8.2%. In the last three years the figure is 13%. On the other hand, costs of the technologies for CAI are decreasing by about 5% per year, coupled with a 10% improvement in performance.

A considerable amount of courseware for PLATO CAI, developed by the University of Illinois, is now available. Several other universities have recently begun to use PLATO and are developing college-level courseware. Florida State University is one. At the University of Quebec in Canada, courses are being developed for use in French-speaking countries.

Thus it is none too soon for colleges to start using CAI on a pilot basis in order to prepare to take full advantage of CAI's potential.

Continuing Education. Continuing education is another area where we should begin pilot operations. Because of the rapid generation of new knowledge, CAI is particularly advantageous in this area. The new methods will bring young and old together in learning centers.

Primary and Secondary Education. Cost-effectiveness in secondary and primary education will occur last of all, yet CAI has important advan-

tages that make it desirable to begin in a modest way immediately. Our limited experience strongly indicates that many underachievers can be stimulated to reach their potential performance levels by participating in just one CAI course. Certainly this sort of result is a bargain, even at present cost levels.

Developing Countries. An international learning network also offers very great advantages to developing countries. Introduction will be paced by availability of satellite communication, but once it is available, rapid progress can be made in surmounting the chief obstacle: a shortage of teachers and administrators. Meanwhile, planning and pilot programs have already begun in some countries, such as Iran and Venezuela.

PROBLEMS ALONG THE WAY

Briefly, that is the scenario I see introducing CBE into virtually all areas of education. But there will be no scarcity of problems along the way.

One difficult problem will be teachers' perception of a threat to their jobs. They will strongly resist the acceptance of educational technology. Although CBE itself will not replace teachers in many courses, it will allow teachers to spend less time on lectures and more time working with individual students. There are many other factors affecting the instructor population, such as growth of open learning. With it comes a shift in relationships, from teacher/pupil toward student/advisor, with an increased ratio of advisors to students. On the other hand, the demand for continuing education is growing and will require more teachers.

"... CBE will allow teachers to spend less time on lectures and more time working with individual students."

We already see new opportunities opening for teachers, especially women, to upgrade their careers. This is because of CBE's great demand for new courseware. Men are not as entrenched in designing courseware as they are in many other fields, hence the obstacles are fewer for women and the opportunities correspondingly greater.

Also, many positions will open up in the marketing of learning center offerings, and many teachers will find those opportunities attractive. To a considerable extent, the sales force will be made up of teachers who will provide the competence to train other teachers and administrators to use the educational products. In any case, the transition to CBE and use of other advanced technologies will occur gradually; whatever change occurs in the teacher/student ratio, it will not cause abrupt reductions in the number of teachers employed. Rather, the teacher population should remain relatively constant, with teacher productivity and satisfaction improving greatly.

"... the teacher population should remain relatively constant, with teacher productivity and satisfaction improving greatly."

In addition to resistance because of perceived job threats, there is, and will continue to be, widespread rejection of innovation in education, particularly where advanced educational technology is involved. The reasons are numerous and complex. Extreme conservatism, concerns for maintenance of individual status, dislike for the idea of profit in education, and concerns for quality of results are some of them. In addition to outright rejection, there is institutional inertia. One practical approach to eliminating the rejections and inertia is to offer superior alternatives on a large scale and let the buyer – the student – make the decisions.

THE PRICING PROBLEM

Another problem is pricing. The present method of financing most formal education with tax dollars, contributions, and tuition at lower than cost inhibits improvements in quality, productivity, and availability. It also restricts options that could otherwise be available and maintains the inequality in educational opportunity that results from uneven district-to-district financial resources.

A change to the so-called voucher system now being tested in Alum Rock, California, is a possible answer. (Vouchers or checks are issued to individuals to buy education in schools of their choice.) A voucher system would force all educational institutions to meet the rigors of the marketplace. In other words, in order to survive, educational institutions would have to operate at competitive levels of quality, cost and availability.

There is another set of costs that are really unmeasurable: the costs of forcing students into a mold called a class where the fast learners are held back and the slow learners learn nothing. Individualized learning on the proposed network would impose no such artificial molds. Those who can learn fast will; those who need more time can take more time, but when they have completed the course everyone will have gained equivalent learning. Obviously, we can't measure these costs, but when we see hundreds of thousands of jobless people of high capability who were bored with school and who quit, we know this is a waste of natural resources that we can ill afford.

Yet another social problem that CBE will solve is that of unequal opportunity in education. The contrast today in quality of facilities and instruction between one school district and another is appalling – and, quite literally, unconstitutional. As costs increase, the have-not districts fall even further behind. The CBE network system is the one best hope for finally coming to grips with this frustrating, lingering problem.

POTENTIAL BENEFITS

The potential benefits from a national network of learning centers are becoming visible today, and they are substantial. Considering that these techniques have only begun to be exploited, even more significant results can be expected. It will take many years to develop CAI and computer conferencing to their full potential. Thus flexibility will permit a mix of the new and the old methods.

The CBE system is here and available to reverse the cost trend and to better meet the needs of society with more flexible scheduling, wider alternatives, and curricula more attuned to the pace of change. New knowledge can be brought into education much sooner. This will be important in continuing education, particularly to the practicing professionals in engineering, health care, and other rapidly developing disciplines. Other advantages are on the horizon, too dimly perceived to describe but certainly there.

CONCLUSION

I will conclude by noting that education is entering a new era, one marked by the beginning of a reversal of the past ever-escalating cost trend. At the same time, we can improve quality, expand availability, and offer more options.

This era will come because a marriage is being consummated between business and education, each contributing what it is best equipped to contribute in order to bring advanced technology and the economies of scale to education.

"There are many obstacles to the successful application of technology to education. The rate at which they will be overcome depends upon the rate at which receptive attitudes develop among educators, administrators, and the tax-paying public."

There are many obstacles to the successful application of technology to education. The rate at which they will be overcome depends upon the rate at which receptive attitudes develop among educators, administrators, and the tax-paying public.

The major obstacles, however, can be recognized as the results of past successes and failures, and *they are surmountable*. The financial resources are available. Enough progress has been made in applying technology to training in business to justify optimism. With the vast market potential in the industrial segment, an educational network now can have the staying power to prove the concept to the rest of education. I believe that this will happen very soon, and I can't think of a more exciting adventure in which to be involved.

A Policy For Export Of Products & Technology

William C. Norris
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Control Data Corporation

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

From an address given at the Fifteenth Goddard Memorial Symposium of the American Astronautical Society on April 1, 1977 in Washington, D.C.

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In order to formulate an appropriate policy for the export of products and technology, one should look at the major needs of our society. These are the reference points against which benefits and risks of exports should be measured.

The number one need is more jobs and almost as important, more skilled jobs. Then other pressing needs include those for the achievement of more abundant and less costly sources of energy, improved energy conservation, greater environmental protection, new materials, less costly food production, more efficient water conservation, revitalization of inner cities, better health care and improved productivity. Solutions to these problems would provide the new jobs needed in the years ahead not only for the young people entering our labor force each year, but also new jobs to replace those that are lost because of changing conditions; for example, economists estimate the petroleum imports in 1977 will cost the U.S. three million jobs.

How does the export of products and technology relate to our major needs? First to be considered is products.

PRODUCTS

Obviously the export of products creates jobs. Since World War II, producing for export has become increasingly important. Over the last twenty years, exports grew from 4.5% of our gross national product to 7.6%, despite a world-wide recession. Altogether our export business directly employs about four million persons in this country. I am not suggesting that a policy of pushing product exports to higher levels will cure unemployment. But I do contend that we should have a policy to encourage the exports of high technology products, as well as many agricultural products, to all countries. It is precisely those products that account for the bulk of U.S. export today. Without continued strong performance in these areas, the U.S. balance of payments will deteriorate and U.S. jobs will be lost.

"The number one need is more jobs and almost as important, more skilled jobs."

TECHNOLOGY

On balance, the export of technology also creates jobs, but as will be explained later, the benefits that can be derived in helping to solve our other major problems by exchanging technology with other countries are significantly more important.

To avoid misunderstanding, I should mention the definition of technology I use is "a way of doing things." I also use the words "technology" and "knowhow" interchangeably. Obviously there is a broad span of technology. How to grow two stalks of rice in place of one is knowhow or technology. How to design a nuclear power plant is another example. Clearly technology is central to the economic process.

One other needed clarification is that I am talking about industrial products and technology and not military products or technology. Further, since it is not possible in many cases to determine whether or not a particular technology has military application, I am talking about all technology developed by U.S. industry for peaceful purposes.

Turning back then to the effects of the export of technology on jobs, studies show that where technology is transferred from U.S. parents to overseas subsidiaries, over the long run there is a net gain in U.S. jobs, although not nearly as great as for the export of products that embody that technology. Of particular note is that the export of technology in exchange for cash does not directly create jobs, expect for those relatively few personnel who are required to effect the transfer – in fact, the number of jobs may eventually decrease depending upon the extent that products derived from the exported technology are imported and displace U.S.-made products.

"The export of technology for cash, except when it has already become obsolete, is not normally of itself in the best interests of either a company or the nation."

The export of technology for cash, except when it has already become obsolete, is not normally of itself in the best interests of either a company or the nation. The purchase of technology is essentially risk-free to the buyer. It represents prior investment, by others, of both money and time – the latter is particularly important because the acquisition of technology saves years in getting a product to market.

In our open society the cost and time to develop technology by a private company are often reduced by the infusion of technology from other companies, government laboratories and both directly and indirectly from our educational system. Thus, our whole society has an investment in technology and this fact must be reckoned with.

"A very economically desirable method for the transfer of technology is to exchange it . . ."

Therefore, a very economically desirable method for the transfer of technology is to exchange it . . . that is, to import technology of a value equivalent to that exported. Societal inputs balance and the time advantage and other benefits accrue to each side. In other words, we should strive for technological cooperation. It is the only way that timely solutions can be achieved for our major problems because the solutions require massive technological resources – far more than any single country can marshal – and even then, the cooperation must be arranged so as to minimize needless duplication.

There is a growing – but still limited – recognition of the need for increased cooperation. NASA, of course, has many cooperative activities. The joint research projects now under way between the U.S. and Soviet Union are other examples. One is the nuclear fusion project, started in 1974 and based on a breakthrough by Soviet scientists. Another is the magneto-hydrodynamics research and development program based on the complementary nature of developments in the two countries. One immediate result was the saving of more than $150 million to the U.S. through the joint use of a Soviet test facility. In addition, the development of MHD is progressing faster and with less risk of technical failure than if the two countries had worked independently. The pending United States/Israeli binational foundation for industrial research and development is another example. Most of the work will be done through cooperation of U.S. and Israeli industrial companies and universities. There are other examples, but they are few and the recognition of the need is still limited.

DETERIORATING U.S. WORLD COMPETITIVE POSITION

Another fact which must be understood in formulating export policies is that of our deteriorating competitive position. The United States is no longer dominant in world technology. Many people are reluctant to accept that reality... but there is an abundance of substantiating facts. Here are some.

"The United States is no longer dominant in world technology. Many people are reluctant to accept that reality..."

There is virtually no technology exclusive to the United States. Department of Commerce statistics show that the rate of generation of industrial technology in Europe and Japan has begun to exceed that of the United States in many areas. Today they have essentially the same technology as we have. One reason is that research and development expenditure in the U.S. is declining as a percentage of our gross national product, whereas other countries are providing financial incentives and allocating a higher percentage of resources to industrial research and development.

Of the top ten research organizations in the chemical industry, rated by size of R&D budgets, only three are U.S. companies. Important areas of nuclear power plant technology are moving faster in Europe. Russia has taken a lead in welding technology and titanium fabrication.

There are numerous areas where the U.S. *is* leading, but by a time margin that is only a few years. For example, we have a lead in computers, but that lead is not overwhelming. European and Japanese computers are in many respects equivalent to U.S. products and competition from them is stiffening.

Experience with Control Data's worldwide computer-based technology transfer service shows that far more American companies are seeking foreign technology than vice versa.

Again the main point is that the United States does not have the technological resources to provide the whole new round of technological innovation required to solve our major societal problems.

What we *do* have are the best management and marketing resources in the world. So, we are ideally positioned to promote and benefit from technological cooperation with other countries.

"What we *do* have are the best management and marketing resources in the world."

RISKS

So much for the benefits from exports. What about risks? There are two categories, commercial and military.

Commercial: Export of technology is really the only area where there are significant commercial risk issues. Clearly there is risk that the sale abroad of current technology could create competition back here at home if the resultant products are imported into the U.S. An example is Japanese products sold in the U.S. that were originally based on U.S. knowhow. But with technology exchange, that is a two-edged sword.

"... If we don't help those countries meet their knowhow needs, other countries will."

Other countries with serious unemployment problems are striving to maximize local manufacture. Couple that with the fact noted earlier, that there is virtually no technology today that is exclusive to the U.S., and we readily conclude that... If we don't help those countries meet their knowhow needs, other countries will. Then we lose three ways. We lose the value of the knowhow, we suffer product competition in world markets, and we don't get knowhow in return that could be the basis for greater competitive thrust for U.S. industry in those same world markets.

So again, the best answer for the United States is cooperation, either through direct exchange of technology, or indirectly through joint projects, jointly-owned companies, or through the establishment of wholly-owned product subsidiaries. It is clear, though, that the last approach is becoming less acceptable to many countries.

Through joint activities it is possible to share permanently in local markets and have an adequate degree of control. Frequently in

joint projects or jointly-owned companies, it is practicable – even desirable – to retain some of the product component production in the United States. The joint activity can carry on related research and development and this technology can flow back to the United States.

"Through joint activities it is possible to share permanently in local markets and have an adequate degree of control."

Military: Military risks are more difficult to assess. One reason is that almost any commercial product, service or technology, ranging from food and clothing to jet engines and electronic computers, can contribute directly to a country's military capability, or indirectly by strengthening its economy. Another reason is that most military developments are covert, so that evidence of the direct utilization of industrial technology for military purposes is much less visible.

"The risk assessment for any item, then, has to boil down to whether or not it is of *significant* potential military benefit."

The risk assessment for any item, then, has to boil down to whether or not it is of ***significant*** potential military benefit. And the only practical answer is to make a determination based primarily on what the U.S. gets in return. If we get a significant technology in return, then we have profited more than the other country, because we are much more effective in transforming knowhow into products.

It should also be noted again that joint activities have the advantage that the U.S. partner has a considerable degree of control and, of course, knowledge of what is going on.

There is also risk in not furnishing the desired products, services and knowhow. I will cover that later.

EXPORT CONTROLS

To complete the perspective, export controls must be considered. The U.S. has had many years of experience with them – what is the result?

Positive results are not obvious. For example, the Soviet Union has not been prevented from carrying out its military weapon objectives in recent years. We are told that its military power has increased dramatically and that it has the capability to destroy the world.

On the other hand, the Department of Defense reports that Soviet progress in some important areas, such as electronics, has been slowed, thus making it possible for the United States to maintain weapons superiority longer in a number of key areas. The results, at best, seem inconsistent, because we are really talking about trade-offs – benefits and risks – not embargoes.

For some years now, we should have been asking whether the lower military risks that are claimed and the corresponding money saved in reduced defense spending in the United States as a result of export control were commensurate with the economic and social detriments of fewer jobs, lost business opportunity, and the gain by foreign competitors who did sell the equivalent or acceptable alternative products to the Soviet Union. We should also have been assessing the implications of the Soviet's deciding to develop their own products or even leapfrog the state of the art to a more advanced technology, which could pose greater military threat to us.

"The gaps created by limitation of U.S. trade with the Soviet Union can be filled by high technology products from others, particularly from West Europe and Japan."

The gaps created by limitation of U.S. trade with the Soviet Union can be filled by high technology products from others, particularly from West Europe and Japan. Although COCOM* was designed to limit export of western technology of military significance, over time and under competitive stress that control mechanism has weakened. Moreover, it has not prevented the Soviet Union from developing its own advanced technology or achieving its military objectives.

There are numerous cases where export licenses to foreign manufacturers have been approved by COCOM even though the office of export control had previously advised U.S. companies that licenses would not be approved.

Over the past nine years my own company alone has lost equipment business in this manner valued at $235 million. This represents an average of 1,100 U.S. jobs per year lost to foreign firms.

Export controls have certainly stimulated the communist countries to develop their own computer industry. Today, virtually all of their needs for small- and medium-sized computers are being met with their own production. The main computer markets left for American companies in communist countries are larger computers and peripheral equipments. But these opportunities will eventually shrink, unless export restrictions are lessened.

*The Coordinating Committee on East-West Trade, established in Paris and consisting of all NATO countries except Iceland, plus Japan.

With moderate relaxation, it is estimated that sales of larger computers and peripherals for U.S. companies could in ten years build to an annual level representing 150,000 high-technology jobs.

This is not a pie-in-the-sky estimate. Indeed, similar increases have occurred in the past when export controls were relaxed. Let me cite just one of many examples. From the end of World War II through most of the 1960s, the U.S. government prohibited the export of Caterpillar earth-moving equipment to the USSR and Eastern Europe. In the latter part of the 1960s, export controls over tractors to these countries were relaxed. Immediately thereafter, sales of Caterpillar tractors and other earth-moving equipments to those countries skyrocketed, thereby creating thousands of jobs for Americans.

"The urgency of the message to relax export controls is made even clearer by taking into account that job increases in the future will occur in smaller increments..."

The urgency of the message to relax export controls is made even clearer by taking into account that job increases in the future will occur in smaller increments... because of progress in automation. For example, employment today in our total semiconductor industry is only 100,000 and for the coal mining industry about 200,000. Coal mining employment twenty-five years ago was 400,000. New automated production facilities require ever-decreasing numbers of employees. The point is that each export case merits a thorough assessment of risks and benefits, but the present methods of export control do not provide for it.

NEEDED: U.S. POLICY ON TECHNOLOGY

The major stumbling block in formulating an appropriate policy on the export of products and technology is the lack of a comprehensive and coordinated U.S. policy on the development and application of technology. There are many different policies with respect to technology followed by different government departments and they often appear unrelated. Many elements are required to make up a comprehensive policy, but a brief review of four will suffice for illustration.

National Priorities:

An essential element that is currently missing is the provision for establishment of national priorities and guidelines for the development and application of technology. Priorities should be described in terms of our most important societal needs and opportunities, along with an analysis of the benefits, including the number and

type of jobs to be created or eliminated. Guidelines would help with policy implementation.

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Inventory of Technology: A second element for a comprehensive policy is a requirement for a national inventory of technology. Nations keep track of goods and services and the balance of foreign trade with respect to goods and services, but most do not make a sufficient accounting of the value of technology transfers.

"Technology is a national resource which is ultimately more valuable than supplies of energy and food..."

Technology is a national resource which is ultimately more valuable than supplies of energy and food...items for which we go to great lengths and expense to have an accurate accounting.

The need to value technology and maintain an accounting of technology trade balances is growing ever more urgent, both because of its increasing volume, and the need to better inform the public about what is going on, so that there will be a much greater understanding of cost and benefits of technology to society.

Worldwide Cooperation: Earlier the importance of worldwide technological cooperation was stressed. Aggressive promotion of it should be a part of policy. Even tax or other financial incentives should be used to encourage widebased cooperation which has a benefit, on balance, to society.

Public Understanding: The policy should also provide for an expanded and continuing education of the American public, including our politicians, on what technology is all about, particularly how it meets basic needs and its effects on employment.

Technology is not widely understood. Even use of the word often causes people to turn off with the attitude that technology is for the long-hairs—don't bother me, or worse, and more recently, technology has become for many, a synonym for environmental pollution.

"We need a policy that fosters the export of virtually any industrial product or technology under appropriate conditions."

OUTLINE FOR AN EXPORT POLICY

Now to get back to what should or should not be exported. First, I believe that we need a policy that fosters the export of virtually any industrial product or technology under appropriate conditions. The thrust must be to expand and not restrict exports. The burden of administration is primarily the determination of minimum appropriate conditions.

For products, appropriate conditions are that they will be used for industrial purposes with reasonable visibility on usage during the life of the product. Only those products or services embodying the most highly advanced technology would be scrutinized.

For technology, the major criterion is an appropriate balance between each country and the U.S. Certainly between the U.S. and the Soviet Union it should be equal. Most technology transfers would occur under a blanket agreement negotiated between governments. Once the blanket agreement is in place, then U.S. companies proceed to establish projects in the traditional manner.

The normal approach for the export of current industrial technologies would be that of receiving technology of equivalent value in return for that exported, or the establishment of joint projects or joint companies where a substantial amount of commercial control and visibility is maintained.

It should also be noted that there are countries that may not be concerned about technology trade balances but prefer to make cash sales of technology to us. This would be very advantageous to the U.S. and should be encouraged. For technology, as with products, only the most highly advanced knowhow would be subject to government control.

"For technology, as with products, only the most highly advanced knowhow would be subject to government control."

A guiding principle in assessing military risk would be that a strong industrial base is the greatest asset of U.S. defense. By keeping the number of cases coming under government control to a minimum, the necessary review of risks and benefits to the nation can be made by a high level commission whose members have unbiased interests and broad perspectives so that all factors are properly

weighed in considering technology policies. This is not achievable in a review involving only representatives of the departments of the executive branch of the government.

Finally, I should note that the complex issues in an export policy are not easily or quickly resolvable. Simplistic approaches do all of us a great disservice.

This outline for a policy for exports is presented in the hope that it will add to the public understanding of a very serious and complex problem and lead to continued study resulting in a comprehensive solution.

Technology and Full Employment

William C. Norris
Chairman and Chief Executive Officer
Control Data Corporation

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

From an address to a public hearing of the Minnesota Full Employment Action Council in Minneapolis, Minnesota, on September 6, 1977. On October 28, 1977, Senator Hubert H. Humphrey (D-Minn.) entered the speech in the *Congressional Record* along with some of his observations.

ED088383

Excerpted from the *Congressional Record*, October 28, 1977, as entered by Senator Hubert H. Humphrey (D-Minn.).

Mr. Humphrey: Mr. President, thousands marched from coast to coast the week of Labor Day demonstrating their desire for policies to achieve and sustain full employment, and testifying to the costs of falling short.

The costs are human and individual: Broken families, low self-esteem, and the gnawing futility of entrapment among the impoverished in a society of plenty. The costs are social: Higher mortality and illness, property crimes of survival, and subsequent imprisonment. The costs are economic: Hundreds of billions of dollars of potential production gone forever, and the consequent inflation from supply outstripped by reasonable demand.

In Minneapolis, Mr. President, The Full Employment Action Council (FEAC) held a public hearing on September 6 at the Regional Native American Center on the need for full employment, and heard from 18 witnesses, including authorities on unemployment costs, planning, political leaders, and the unemployed themselves.

The first witness was Mr. William Norris, president of Control Data Corp., one of the largest firms headquartered in Minnesota. Control Data, with offices and outlets across the country and throughout the world, is a fine corporate neighbor to the Midwest. It pays its taxes and provides jobs; it builds assembly plants in depressed areas of our large cities; it innovates to stay at the frontier of a complex vital industry; and finally, it provides quality services and products to our citizens in healthy competition with other computer companies also situated in our part of the country.

Mr. Norris' statement stressed the importance of full employment, calling the present situation "the Nation's No. 1 problem." In pointing out the need for 20 million new jobs in the next decade, Mr. Norris cited the role of business in developing new products and sharing information on useful technological improvements. But sharing information in a world full of paper is a big job that requires organization to obtain economics of scale. And that, he tells us, is a long way from happening:

"The reluctance of private industry, coupled with the grossly inefficient methods of government and academia for communicating information, result in the technological wheel being wastefully reinvented every day. Moreover, technologies are lying on the shelf grossly under-utilized."

He suggests some ideas of how to facilitate technological information exchange. These views are well considered and deserve attention from Congress.

Among other insights Mr. Norris provided was a candid assessment of the hesitancy of some segments of the business community to embrace enlightened objectives in employment and social policy:

"But the increase in technological innovation that could reasonably be expected in today's environment would fall far short of what is required. The reason is primarily the indifference of business toward major societal problems. For too long business has been preoccupied doing the things that are the most profitable and leaving the solutions to most of the major problems of society as the responsibility of government. Meanwhile, these problems are growing to disastrous proportions."

Let me add my voice of assurance to those in the private sector who are listening: We in Government welcome all the help we can get.

Finally, Mr. Norris addressed the legislative context for sustaining balanced growth with full participation of dynamic, innovative commercial enterprises:

"The legislative actions required to more effectively convert technology into jobs through the concentration of resources on a regional basis to focus efforts and achieve widespread cooperation appear to be embodied in the provisions of the Humphrey/Hawkins (Full Employment and Balanced Growth) bill. As noted earlier, the types of projects that need to be undertaken to meet societal needs are the same as those, or could be, that are to be implemented by the full employment and balanced growth plan of the bill."

I wish Mr. Norris hearty success in persuading his business colleagues of the benefits of sensitivity toward the needs of society including full employment.

SUMMARY:

Technological innovation is the wellspring of new jobs. To help solve the problem of unemployment, technological innovation must be increased by making existing technology more available; by accelerating the creation of new technology, and devising more effective means of applying technology.

The major focus must be on unemployment – identifying and stimulating the private sector to undertake projects for creating new jobs. The central vehicle for coordinating the resources of all segments of society should be regional development offices. These offices will facilitate programs that create jobs by addressing the needs of society. Suggested programs include fostering entrepreneurial enterprise, developing alternate energy sources, revitalizing urban centers, reducing minority youth unemployment, and developing alternatives to capital- and fossil fuel-intensive methods of farming.

Legislative actions are required to achieve these goals. The types of projects that need to be undertaken can be the same as those proposed in the Full Employment and Balanced Growth Plan of the Humphrey/Hawkins Bill. All sectors of society must work together to solve the problem of unemployment. Only from this united effort will come the needed jobs and the enduring solutions to the other major problems of our global society.

The opportunity to participate in this forum is greatly appreciated. It would be most gratifying if I were able to contribute to a long-term solution to unemployment, because I believe it is the nation's number one problem.

Not only are more jobs needed, but almost as important, more skilled jobs. The unemployment problem will become even more critical as in the next ten years another twenty million new jobs will be required. This would be the largest increase of any decade in our history; in the last ten years only thirteen million were created.

The basic question is whether the U.S. can increase jobs and still improve productivity or whether this is another situation where we only can make trade-offs: are we faced with a choice between more automation, better productivity, and fewer jobs on the one hand or more jobs, less efficiency, more inflation, increased government payouts and deficits on the other?

TECHNOLOGICAL INNOVATION

This apparent dilemma is solvable through increased technological innovation. Technological innovation is the wellspring of new jobs. Capital investment is also a source of jobs and capital is required to support technological innovation. A dollar invested in technology will create more jobs and return more income than the same amount invested in capital equipment.

Technological innovation is one of the key factors in productivity improvement, along with capital investment and employee training.

"Not only are more jobs needed, but almost as important, more skilled jobs. The employment problem will become even more critical as in the next ten years another twenty million new jobs will be required. This would be the largest increase of any decade in our history..."

To avoid misunderstanding, I should mention that the definition of technology I use is "a way of doing things." I also use the words "technology" and "knowhow" interchangeably. How to grow two stalks of rice in place of one is knowhow or technology. How to design a nuclear power plant is another example. Obviously there is a broad span of technology.

HOW TECHNOLOGY CREATES JOBS

Now let me give you a clear example of how technology or knowhow creates jobs. You have probably heard of or seen the portable sanitation units – or portable chemical toilets – that are used on construction sites. Before these portable units, there were environmental pollution, unsanitary conditions, and lost time by workers due to improvisations. Then some innovative individuals in various parts of the

country combined chemical knowhow, low cost construction technology and servicing management to provide an economical answer to the problem. Jobs were created in the manufacture of the units and in the servicing. Today in this business, there are over a thousand manufacturing jobs and another three thousand servicing jobs throughout the U.S. It is now a $100 million industry with over a thousand small businesses contributing to the economy of communities in every state. And it continues to grow.

"A dollar invested in technology will create more jobs and return more income than the same amount invested in capital equipment."

As more knowhow is put into manufacture of the units, costs are reduced. As you know, this is called productivity improvement. Lower unit costs, combined with efficiencies in service, open up new uses and the employment of more people. In addition to construction sites, the units are being used at fairs, athletic events, parks, boat landings, summer cottages and home barbecues.

Although this example clearly illustrates job creation and productivity improvement, these results are not so visible in most cases. However, there have been many studies that verify the processes. For example, one study of the linkages between jobs, productivity and technology shows that growth of employment in high technology industries is almost nine times as fast as in low technology industries; output growth is almost three times as fast, and productivity twice as fast.

BUSINESS AND THE PROBLEMS OF SOCIETY

But the increase in technological innovation that could reasonably be expected in today's environment may fall far short of what is required. The primary reason is the indifference of business toward major societal problems. For too long business has been preoccupied doing the things that are most profitable and leaving the solutions to most of the major problems of society as the responsibility of government. Meanwhile, these problems are growing to disastrous proportions.

"For too long business has been preoccupied doing the things that are most profitable and leaving the solutions to most of the major problems of society as the responsibility of government."

For example, one of the most serious societal problems that's closely related to employment is the achievement of more abundant and less costly sources of energy. Our economy is utterly dependent on cheap and readily available gas and oil for energy. Within twenty to thirty years, world production will begin to fall off. Considering that fifteen to twenty years are required to get meaningful results from the average

new development, there is precious little time available to avoid disaster.

There are many other major societal problems crying for more attention. These include the improvement in energy conservation, greater environmental protection, new materials, less costly food production, more efficient water conservation, revitalization of inner cities, better education, better health care and improved productivity.

"What is required are jobs that are created from products or services to meet the country's long range needs. This should be our main thrust for job creation."

Solutions to this vast array of major problems, along with a nationwide increase in technological innovation, will in the long run, provide millions of private industry jobs that must be part of a systematic route to full employment. What is required are jobs that are created from products or services to meet the country's long-range needs. This should be our main thrust for job creation. As a businessman, I have been involved for over 30 years in establishing small businesses that have grown and have provided needed products and services and, along the way, more than 40,000 jobs.

So I believe that leadership for planning and implementing full employment programs must be provided by business, working in cooperation with universities, government, labor unions and other major segments of society. These programs should be planned so that they are in accord with the national goals and priorities embodied in the full employment bill. Our major societal problems are massive ones and massive resources are required for their solution. The best approach is that they are viewed as business opportunities with an appropriate sharing of cost between business and government. Economic growth will be stimulated along with job creation. The key resource needed is technology, i.e., the knowhow to solve the problems.

In order to create jobs, improve productivity and increase technological innovation at affordable costs, we need to make existing technology more available and to devise more effective means of putting technologies to work. Only by doing this will we achieve the most timely solutions to our major societal problems.

BETTER AVAILABILITY

In elaborating on improved availability, it should first be noted that there is a vast amount of valuable technology throughout the world. But much of it is little known and little used because of lack of efficient mechanisms and incentives for communicating knowledge and then actually transferring technology to productive use. In other words, the transfer of technical information and technology is grossly inadequate within our society – in government, in industry and in our universities.

"... the transfer of technical information and technology is grossly inadequate within our society..."

The Federal government spends more than $1 billion annually to disseminate results of federally-funded research and development. Yet it is frequently impossible or extremely difficult for either government or industry to obtain these results in a useful form. And let me repeat – in a useful form.

The reasons include inadequate records, ineffective coordination of federal programs, lack of attention to the needs of industry, and inattention to the information and technology transfer needed by the scientists and the engineers who create the technology. Since most university research is government-sponsored, it suffers from similar patterns of poor dissemination of results.

In the private sector, there is relatively little transfer of technology across industries. Yet studies show that many major innovations are the result of applying the technology of one industry in another; e.g., the high-speed computer initially came from the electronic industry, not the business equipment industry; instant pictures were not invented by Eastman Kodak, and so on. The bottleneck in industry preventing more of this happening is the concern for maintaining an exclusive proprietary position. In the private sector we find a dichotomy between "over-protection of rights to technology" and "responsible sharing of technology for economic and social good"; a new attitude of cooperation by private companies is needed.

The reluctance of private industry, coupled with the grossly inefficient methods of government and academia for communicating information, result in the technological wheel being wastefully reinvented every day. Moreover, technologies are lying on the shelf grossly under-utilized.

"The reluctance of private industry, coupled with the grossly inefficient methods of government and academia for communicating information, result in the technological wheel being wastefully reinvented every day."

Obviously we must use our technical information and technologies more efficiently in creating jobs and in improving productivity. Further, we must remain aware that productivity improvement alone can be counter-productive to full employment. It must, therefore, be accompanied by a creative force for new products and services that will absorb both the newly unemployed and the expanding work force.

Technologies, wherever obtainable, should be viewed as the single richest potential source for the creation of new jobs. They provide the basis for whole new businesses and for new and improved products and services in existing business.

A major need, then, is to increase greatly the efficiency with which information on the vast reservoirs of technologies in government, universities and industry is communicated to those who can create new jobs by converting those technologies to new products and services. Increased efficiency in communications is essential, but not sufficient. Such sharing is non-traditional and difficult. Special incentives are also needed, including tax breaks, to induce the private sector to make its technologies more available.

"Increased efficiency in communications is essential, but not sufficient. Special incentives are also needed, including tax breaks, to induce the private sector to make its technologies more available."

Policy changes and productive legislation are needed, summarized as follows:

A. A clearly stated redirection of policy to achieve the broader use of government-sponsored R&D results in the creation of jobs.

B. Stimulation of government laboratories and universities to make their technologies more available and to aid in their efficient transfer. This can be achieved by allocating a percentage (five to ten percent) of project funds to information and technology transfer, and by assigning added responsibility and incentive to scientists and engineers doing the work.

C. Encouragement of government agencies having informational data bases to make them available to the private sector at minimal cost.

D. Provision of tax incentives or direct payments to encourage private companies to sell and/or lease their technology for the public good. This type of government support would only be a front-end requirement to stimulate the initial creation of jobs.

NEW TECHNOLOGY

While more efficient transfer of existing technologies will be of enormous benefit, there are also new technologies needed for solving our major societal problems. However, the investment and risk required for many such developments are either beyond private industries' resources or do not provide an acceptable return on investment. Therefore, we must keep in mind that technology developed by one company or group of companies eventually has major benefits to the entire economy, and because of these extra benefits or "social dividends," support is warranted from society as a whole.

Normally the development of technology that is financed by private enterprise has a large enough payout and low enough risk that an acceptable return on investment in R&D is virtually assured, even though a greater return is eventually realized by the rest of society. Society usually gets from private business the products that meet conventional business tests rather than those that address the more funda-

mental needs of society. Without government support, therefore, technology to meet all of society's needs will not be created. Therein lies a major reason why private enterprise is not aggressively pursuing solutions to many of our most pressing problems.

A whole new round of innovation is necessary. Innovations are needed like the discovery of electrical power, the invention of the telephone, or the beginning of the chemical industry in the 1880's. There are many likely targets: solar energy, fusion energy, new products that use much less energy, new materials, water conservation methods and new agricultural technologies. The costs will be very high and the risks great, both because of uncertain technological outcome and unpredictable market reception.

The diverse technologies created will be useful over a range much broader than the initial projects because of the subsequent development of new products, processes and services and the improvement of existing ones. Hence, new technologies will have far greater value to society than can be realized by the individual companies involved. Clearly government should join with private companies to pursue these projects. Leadership and management should come from the private sector and funds from the government until experimental models prove feasibility and the risk is manageably reduced. Thereafter, the balance of the cost should be borne by industry.

"... new technologies will have far greater value in society than can be realized by the individual companies involved. Clearly government should join with private companies to pursue these projects."

Projects that meet societal needs, such as those for new energy sources, better transportation, environmental improvements, and water conservation, should be supported under the priorities and programs part of the Full Employment and Balanced Growth Plan of the Humphrey/Hawkins Bill. In meeting these needs not only will jobs be created, but many of them will be skilled jobs. This is particularly important so that those who take lower-level, shorter-term employment in jobs corps and public works can look forward to job opportunities at a higher skill level.

PUTTING TECHNOLOGY TO WORK MORE EFFECTIVELY

Increasing the availability of existing technology and developing new technology are both essential, but we must put technology to use more effectively in order to achieve the most timely solutions to major societal problems.

The major deterrent is the widespread lack of understanding of the role technology plays in the economic process, particularly that new jobs are derived from the application of technology. Moreover, just the use of the word "technology" often causes people to turn off with the attitude that technology is for the long hairs – don't bother me – or

worse. More recently, technology has been thought of by some people as a synonym for pollution and dehumanization. So there is not only lack of support for increased technological effort, but opposition by some – both reactions stemming primarily from a lack of understanding.

Yet, there is a deeply-rooted and growing concern in our country, and indeed worldwide, over unemployment. Efforts, albeit not very effective, are being made toward more permanent means for creating jobs as opposed to the short-term job corps/public works-type of approach.

Most of these efforts have been concentrated on facilitating the formation, development and more efficient operation of small businesses for achieving economic growth and creating new jobs.

One such effort, with partial funding by the National Science Foundation, has resulted in innovation centers at the Massachusetts Institute of Technology, Carnegie-Mellon and Oregon State Universities.

"The major deterrent is the widespread lack of understanding of the role technology plays in the economic process, particularly that new jobs are derived from the application of technology."

The Small Business Administration started one such effort by making $300,000 available in 1977 to test the concept of establishing small business development centers at eight cooperating universities. These centers aid small businesses with their management problems, particularly those involved in starting new companies, and with finding and applying technologies required for new or improved products and services in existing organizations. This program will be expanded in 1978.

There are other similar organizations like the new Enterprise Institute in Maine, started in 1974 with the belief that entrepreneurship and innovation in the small business sector was the fastest route to healthy economic growth in Maine. Its funding level is about $700,000 over five years and is provided mostly by a grant from the Kellogg Foundation.

One organization in a formative stage is the Committee of Urban Public Universities. This group's objective is to coordinate and apply university resources more effectively in cooperation with other public and private organizations to help solve unemployment, urban blight and the like.

There are many other community organizations that are engaged in facilitating economic growth in various ways by helping to finance new plant construction, inner city housing revitalization, public works, etc.

These many types of organizations do help to create jobs but usually on too small a scale. They are fragmented and duplicative, and too often merely study problems instead of providing solutions. There is not adequate involvement of big business, labor unions, churches, uni-

versities or local governmental units; and most of the organizations have low visibility. They are micro solutions to macro societal problems. These are massive problems requiring massive resources and entailing many controversial issues.

FOCUS ON UNEMPLOYMENT

What is needed is a pulling together of available resources on a regional and national scale to identify, prioritize and facilitate problem solutions with the implementation being done in the traditional manner by the private sector.

"The major focus must be on unemployment – identifying and stimulating the private sector to undertake projects for creating new jobs."

The major focus must be on unemployment – identifying and stimulating the private sector to undertake projects for creating new jobs. Although the main emphasis would be on unemployment, other societal problems would be addressed whose solutions help create jobs.

This approach has several advantages. One is that only by much more direct involvement of major segments of society will there be adequate general awareness of what technology is all about and what its relationship is to jobs and productivity. Another benefit is that of societal consensus – most will agree that the number one need is more jobs. Many who would reject proposals for increased government spending in development of alternate energy sources for fear of increased pollution or unjust enrichment of business, would seriously study and more likely support actions leading to more jobs.

AREA DEVELOPMENT OFFICES

The central vehicle for new job creation would be the establishment of regional development offices. These would be highly visible and would involve all segments of society. Their principal objective would be to identify and to help promote the means of creating new jobs, chiefly through the more efficient use of existing technology and the development of new technology. The development offices would motivate businesses, particularly large corporations, to assume leadership in programs to solve major societal problems, using techniques discussed earlier.

Specific Functions:

1. Selection of appropriate societal problems for attack.
2. Encouragement of businesses to assume the leadership of projects for solving the problems.
3. Encouragement of cooperation among businesses and between business and universities in implementing the projects.
4. Dissemination of research and development information on services and products required to help meet major societal needs.

5. Stimulation of companies to make their technologies available to others for non-competitive uses.
6. Encouragement of non-research intensive companies to upgrade their technical capabilities.
7. Assistance to aspiring entrepreneurs and inventors in evaluation and preparation of business plans and start-up efforts, together with identification of financing sources.
8. Assistance to small businesses in acquiring new products for manufacture, distribution or servicing.
9. Promotion of state and federal legislation to increase support for technological innovation.
10. Suggestions for helping establish national priorities and goals.

The area development office would be manned by a small permanent staff. Professional expertise needed for program selection and promotion would be supplied by volunteers employed by other organizations and by retirees.

Financing: The cost of supporting the permanent staff and a limited number of research studies would be borne by annual contributions from the participating organizations. Costs of any research study requiring a very large effort would be covered through federal or state government grants.

POTENTIAL PROGRAMS

The method of operation of an Area Development Office is best explained by looking at five programs that might be undertaken.

"One important type of program is that of fostering the start-up of new, small enterprises. A new business means new jobs."

Entrepreneurial Enterprise: One important type of program is that of fostering the start-up of new, small enterprises. A new business means new jobs. An inventor has an idea for a new product or service, and wants to start a company to develop and market it. Financial backing from the usual sources is not available. Venture capitalists are usually not interested in unproven ideas.

The Area Development Office provides assistance. A volunteer team of experts are assembled from local business and universities to review the idea, and if sound, to help in the preparation of a business plan and in the prompt completion of the many other steps in setting up a business. Since there is substantial risk, the initial capital is spread among a number of investors, including all types of businesses, banks, insurance companies, larger industrial companies, venture capitalists, plus labor unions, religious organizations and local civic and government units.

The potential for job creation can be glimpsed by noting that the Small Business Administration estimates that there are 800,000 would-be entrepreneurs in the U.S. If half were able to succeed in starting a business employing an average of ten persons, there would be 4,000,000 new jobs created.

Solar Energy: Another important project would be one to facilitate the development of solar energy. In view of the critical importance of alternate sources of energy, a huge increase in development is needed.

"Another important project would be one to facilitate the development of solar energy... Here again there is an enormous potential for job creation..."

The approach should be to identify the projects with the best potential and encourage implementation by existing companies. When the risk is too high, or financial commitments are beyond the means of individual companies, then joint ventures should be encouraged – either by collaboration between existing companies or through the formation of new companies.

Here again, there is an enormous potential for job creation. There are about 180 companies in this field, most of them small; so if more technology were available, not only would the present ones expand, but many new businesses would start up.

Urban Program: Another important program is one helping to revitalize declining inner-city areas and to alleviate the nation's housing crisis. All new technology is not needed, but many existing technologies are not widely known.

The inexorably rising costs of transportation will reduce drastically the distances people can afford to commute daily. Hence, there will be residential clustering around employment centers and incentive for industry to locate amid existing housing.

Resolution of the nation's housing crisis will require a much expanded level of effort in the construction and maintenance of affordable housing. Preservation of existing urban housing offers great entrepreneurial opportunities and potential for job creation.

"Reducing unemployment among minority and disadvantaged young people is another priority program."

Reducing Minority Youth Unemployment: Reducing unemployment among minority and disadvantaged young people is another priority program. The present forty percent rate of unemployment among the minority young in most of our large cities is not only shameful, but dangerous.

It is certain that dedicated and coordinated large-scale cooperation among business, government, academia and labor can make a vast improvement. This has been proven by Control Data's success in placing plants in poverty areas, by our computer-based basic skills training, counseling and placement service, and by the success of 70001 LTD.

70001 LTD. is a non-profit organization that operates with CETA (government) funds. It provides out-of-school, unemployed youth with immediate employment along with on-the-job training, education and development of self-confidence and motivation to enter and advance in the field of marketing and distribution. It has extensive cooperation and support from the American Retail Federation and related national business firms. The 70001 Program is producing significant results, but it is limited to the retail field, with emphasis on personnel guidance and counseling. Unfortunately, it does not deal with the huge bulk of the more severely disadvantaged. Even so, 70001 is a good start and does show that meaningful cooperation can occur among major sectors of society.

Back to the Countryside: A longer range program to be considered is one that stimulates and supports migration back to rural areas. There is a trend in this direction although it is not yet a true back-to-the-farm movement. This trend will no doubt continue – even accelerate – but without proper planning fuel shortages, unemployment, lack of adequate education and health care, and other problems will develop. Thus, a number of urban problems will spread into the countryside and become even more difficult to solve.

"... the salvation of the small farmer may not occur automatically and, most certainly, will not occur at all unless technology for increasing the efficiency of the small farm is developed."

Migration back to the countryside, including a movement toward smaller farms, if encouraged and properly managed as part of a national program and accompanied with appropriate broad-based research and development, would have great benefits for our society. Unemployment would be materially reduced. Food production would be increased, and food costs decreased. Greater conservation of natural resources and more environmental protection would be achieved along with the provision of a greater availability of a life style of growing popularity.

Many elements of change affecting agriculture and food processing are already apparent that not only support this thesis, but dictate its adoption. These include the steeply rising costs of energy, decreasing availability of fossil-based fuels and fertilizer, rising costs of equipment and land, the growing scarcity of water, unacceptable environmental degradation and diminishing returns from many of the present directions of agricultural crop breeding research.

The present highly-centralized, enormously capital-intensive, fossil-fuel-dependent and environmentally destructive methods should start to give way to more decentralized approaches that are more in harmony with nature.

The advances in communications-oriented data processing techniques, including computer-based education, will make it possible to reduce drastically the amount of travel required by rural people in seeking occupational and educational alternatives. It will be feasible for many kinds of work to be performed in the home or in small operations near by, with needed education and information accessible in the same manner.

These views conflict with the most prevalent ones which are extrapolations of the past and predict the eventual extinction of the small farmer. These predictions may yet be borne out because the salvation of the small farmer may not occur automatically and, most certainly, will not occur at all unless technology for increasing the efficiency of the small farm is developed.

"What I'm proposing is to enlist all sectors of society to solve the problem of unemployment."

What is needed are national goals to develop alternatives to the present fossil fuel-intensive, huge capital investment and environmentally destructive approaches. The goals should include the formation and operation of smaller units with appropriately scaled equipment and methods that require a minimum of fossil fuels and involve more human labor – not back-breaking labor, but the work that's involved in integrating a small but diversified operation.

LEGISLATION

The legislative actions required to more effectively convert technology into jobs through the concentration and cooperation of resources on a regional basis appear to be embodied in the provisions of the Humphrey/Hawkins Bill.

As was noted earlier, the types of projects that need to be undertaken to meet societal needs are the same as those that are to be implemented by the Full Employment and Balanced Growth Plan of the bill.

"... the old ways are not working, partly because solving the unemployment problem is always 'someone else's' problem."

Also, the proposed Area Development Offices would be the best source of data for establishing national priorities that are specified by the Humphrey/Hawkins Bill. Moreover, these offices are indeed needed for achieving the most timely solutions to major societal problems.

To conclude, what I am saying is that the old ways are not working, partly because solving the unemployment problem is always "Someone Else's" problem. Everyone really only wants to keep doing what he is doing and doesn't want to change. What I am proposing is to enlist all sectors of society to solve the problem of unemployment. In working together to help solve it, there will be not only a better understanding of the origin of jobs, but also of the enormous difficulty to create them. Out of this effort will also come a much better and badly needed understanding and respect for each sector of society by the others. Most important, out of this effort will come more jobs.

"Out of this effort will come more jobs."

Back to the Countryside Via Technology

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This address was given to the National Agri-Marketing Outlook Conference on November 8, 1977, in Kansas City, Missouri.

Farming is a subject that is particularly close to me. I grew up on a farm in south central Nebraska. We raised corn, cattle and hogs.

We almost lost that farm during the great depression, in the summer of 1934, when Nebraska was in the throes of the most devastating drouth ever to sweep the Great Plains.

I was a senior in engineering school at the time and was called home, after dad died suddenly, to run the farm. Feed was scarce. We were about to lose our fine herd of Herefords that we had worked for years to build.

It was a tragedy that many farmers on the Great Plains were suffering that year.

Our herd was too valuable to sell for rock bottom prices in a glutted market. A way had to be found to feed them over the winter. To sell them was to lose the farm.

Then one hot summer afternoon I came upon the answer – the one thing that was thriving on those hot, dry fields was thistles – lush green Russian thistle weeds blantantly growing amid the seared and shriveled corn.

I remembered as a small boy, helping my dad feed the cattle and noticing a cow pick an immature thistle out of the green alfalfa and eat it.

So we decided to cut and stack the tender thistles before their prickly heads matured. Neighbors thought we were nuts; hence it was difficult to find help. No one wanted to risk being laughed at.

"Our herd was too valuable to sell for rock bottom prices in a glutted market. A way had to be found to feed them over the winter. To sell them was to lose the farm."

But the thistles were finally cut, stacked and fed as roughage to the cattle through the winter, supplemented with concentrated protein feed.

And the cattle made it through the winter. It rained the following spring and we saved the farm. I still manage the farm, principally by phone, from Minneapolis.

Another important part of my life is computers. I started a computer company – Control Data – twenty years ago. Last year Control Data had revenues of over $2 billion . . . we operate in thirty-three countries and employ more than 45,000 people.

Twenty years ago computers seemed to be a long way from agriculture, but not any more. Today farmers are being helped in many and varied ways including aid in deciding on what crops to plant, optimum mix for livestock feed, when to irrigate and financial management. And as will be noted later, computer technology is the keystone in the "back to the countryside" program.

RATIONALE

With that brief background, let me start to establish the rationale behind my remarks today by noting the reversal of the longstanding country to city migration. For example, between 1970 and 1975, population of non-metropolitan areas in the U.S. is estimated to have grown about twice as fast as that of the nation's cities. This is a reversal of the trend that has been going on for decades. It is not yet a back to the farm movement. Farm population continues to drop. And although the trend back to the countryside will probably continue, without proper planning, fuel shortages, unemployment, educational, health care and other serious problems will develop.

"There are many elements of change already intrain affecting agriculture and food processing, that not only support this thesis, but dictate its adoption."

Migration back to the countryside, including back to the farm, if encouraged by national goals and properly managed, along with appropriate research and development, would have great benefits for our society. Unemployment would be materially reduced, food production increased while production costs decreased, and greater conservation of natural resources and more environmental protection would be achieved along with providing a greater availability of a life style of growing popularity. Virtually all segments of society would profit in one way or another.

There are many elements of change already intrain affecting agriculture and food processing, that not only support this thesis, but dictate its adoption. These include the inexorably rising costs of energy, decreasing availability of fossil-based fuels and fertilizer, rising equipment and land costs, the growing scarcity of water, environmental degradation and diminishing returns from many of the present directions of agricultural crop breeding research.

The present highly centralized, hugely capital-equipment-intensive, fossil-fuel-dependent and environmentally destructive methods should now start to give way to the more decentralized approaches of smaller farms and smaller food processing units that use alternate sources of energy.

This scenario does not represent the most prevalent views which extrapolate the past and predict the eventual extinction of the small farmer. But we now know that in many areas the future can not replicate the past and if we plan for and manage the changes that are already emerging, great benefits can be achieved sooner. Let me analyze each major element of change, starting with energy.

ENERGY

The rising costs and decreasing availability of fossil fuels are producing a wide range of economic consequences that will increase in severity. Some have already reached the critical stage. For example in the

Trans-Pecos region of Texas, a vast and arid region requiring irrigation for crop raising, water has to be pumped three hundred feet or more to the surface. In 1974, natural gas, the fuel used for pumping, was $0.34 per thousand cubic feet. In 1976 the cost was $1.85 and at that level very little can be grown at a profit.

Pump irrigation is a very heavy consumer of energy; for example, in Nebraska a center pivot irrigation system requires roughly ten times the fuel to irrigate a field as is needed to till, plant, cultivate and harvest a corn crop.

In addition to its cost, there is also the availability of petroleum to consider because many areas rely on it where natural gas is not available. The OPEC embargo has proven that the U.S. can be shut off and rumors of threats have occurred since. Ultimately as world supplies dwindle, petroleum will have to be conserved for priority uses, such as air transportation.

Development of alternative energy sources must be accelerated. Solar energy, windmills and refuse converters are all feasible alternatives as reliable and economical sources for agricultural use.

There are many new possibilities such as that of combining energy generation with plant growth enhancement; for example, one is a system with solar heat collecting and storage in which mirrors reflect light on heat storing materials. The heat is then converted to electricity. When the sun is not shining, the mirrors are used to reflect artificial light over growing crops, thus producing yields greater than normal.

"Development of alternative energy sources must be accelerated. Solar energy, windmills and refuse converters are all feasible alternatives as reliable and economical sources for agricultural use."

These kinds of systems for generating energy and enhancing the growing process will tend to be of an intermediate scale not highly automated but requiring considerable human involvement.

FERTILIZER

Since much of the nitrogen fertilizer presently used is derived from petroleum products, there are the same problems of availability and cost of fertilizer as those pertaining to energy. In addition, there is the serious pollution problem of run-off from fields.

Scientists are urging that increased research efforts be made to advance nitrogen fertilizing means not dependent on fossil fuels, such as development of a synthetic nitrogen-fixing process using renewable resources.

Many more sources of stimulants for plant growth must be researched. For example, the Soviet Union is experimenting with lased water. A preliminary report indicates the water treated with a laser beam can

raise crop yields by fifty percent. Also in the Soviet Union, experiments are being made to use furnace ash from power stations that is magnetized as fertilizer. Results indicate heavier yields of some root vegetables. In Israel heated water ripens cucumbers a month earlier.

These experiments are examples of the many feasible directions for research effort.

WATER

Agriculture is placing increasing demands for water as the amount of land irrigated is increased. At the same time consumption is rising rapidly in industry and a growing population is using more and more water per capita.

"Plainly, increased efficiencies in the usage of water are mandatory and they must be sooner rather than later to avoid serious crunches."

The recovery of oil from oil shale and tar sands which will surely have to be done in the future will require enormous amounts of water.

Plainly, increased efficiencies in the usage of water are mandatory and they must be sooner rather than later to avoid serious crunches.

ENVIRONMENTAL

Chemicals used in insect and weed control are also increasing rapidly in cost and there are growing objections by environmentalists to their continuing intensive use, because of pollution and wild life destruction.

Run-off pollution from fertilizers and chemicals is greatest where crops are planted in rows. Yet today's form of large-scale mechanization for corn, cotton and soybeans could not be used otherwise.

Soil erosion is an even more serious problem with row crops. Not only is there the loss of top soil, but erosion accounts for more than fifty percent of the pollution in our streams.

LARGE VERSUS SMALL FARMS

Land costs have risen manyfold in recent years, in some areas five or six times. Today's land costs and interest rates can in many cases double the cost of production. Rising land costs are making it difficult for young people to start up in farming. In recognition of this, the Minnesota legislature approved a law in 1976 authorizing the state to guarantee ninety percent of loans for land purchase. The state also pays parts of each interest payment and is repaid the interest subsidy at the loan's maturity date.

In the past the rising cost of land has been offset to a considerable extent by more efficient equipment and increased yields obtained through plant breeding, crop specialization, fertilizers, chemicals and irrigation. Constraints developing in these approaches have already

been pointed out, except for farm equipment. But here too they are developing.

"Rising land costs are making it difficult for young people to start up in farming."

One of the most important sources of growing productivity in U.S. agriculture has been the greater technical efficiency achieved on large farms as compared to small farms through the use of large machinery and large tractors, particularly the latter. A four-wheeled drive with horsepower of 300-350 is coming into wide use and it performs more work per horsepower than the conventional two-wheeled tractors.

Speaking of tractors reminds me of an old, old story about the enthusiastic young tractor salesman and the wise old farmer.

The salesman was driving one day through the countryside looking for prospects. His head was full of facts and figures about why farmers should buy new tractors.

Then as he was driving by a field he saw an amazing spectacle and braked his car to a screeching halt.

"If we don't move rapidly in developing alternative sources of energy we are going to have less and less to say about availability, and foreign nations will be deciding who gets their oil and under what terms."

He leaped out and hailed a farmer who was at work plowing his field. Pulling the single bottom plow was a bull the farmer had appropriated from his dairy herd.

As the salesman approached, the farmer reined in the bull and sauntered over to the fence. He listened intently to the salesman who gave him all the reasons why it was not economical to use a bull to plow a field, especially when efficient modern new tractors were available.

After a few minutes of quiet listening, the farmer interrupted the enthusiastic young man and said:

"Oh, hell, I know all about tractors. But I'm teaching this bull that there's more to life than just tearing up fences and chasing the neighbor's heifers."

Like the farmer's bull, even though we may not want to, we must consider change. The starting point is the cost and availability of petroleum, which must now be reckoned with in considering equipment of the future. Already almost fifty percent of the decision on availability is beyond our control because we are importing almost that high of a percentage of petroleum. Losing that much control is serious enough. If we don't move rapidly in developing alternative sources of

energy we are going to have less and less to say about availability, and foreign nations will be deciding who gets their oil and under what terms. It is likely that the lowest cost, most available alternative power sources initially will be electricity derived from solar, wind, nuclear or hydro sources. A whole new round of development will be required to adapt mobile power units to electricity. At first, only relatively small units powered by electricity will be feasible.

The ultimate availability of more appropriately sized farm equipment powered from alternate energy sources would help to reverse the present trend toward larger farm units with capital-intensive methods back to smaller units in a number of areas of farming.

LOWER COST FOOD PRODUCTION

Given the inexorably growing constraints of petroleum, fossil-based fertilizer, water, environmental and land costs, it is imperative that the costs of production be cut drastically. This is most likely to be achieved in the long run by moving towards smaller farm units using more labor-intensive methods. I am not talking about a mule and forty acres or even a bull and forty acres. In other words – not back-breaking labor, but human involvement in coordinating and directing many smaller scale activities. Also implied is less specialization and movement toward integration of a variety of crop, livestock and other activities.

OTHER COUNTRIES

It is essential to include a few highlights with respect to other countries in this review, in order to help distinguish and validate the correctness of the directions proposed as well as to establish the basis for more cooperation among nations.

There is growing evidence in other industrialized countries of similar trends reversing the drift from the land. In 1975 for example, the number of farm workers in England and Wales went up.

"There is growing evidence in other industrialized countries of similar trends reversing the drift from the land."

In the developing countries, green revolution agriculture is also highly fossil fuel intensive, especially with respect to fuel, fertilizers and pesticides. Thus there is a significant and growing similarity of the research and development needs of the industrial and developing countries that include alternatives to fossil fuel energy, more natural types of fertilizers, non-chemical pesticide control, water conservation, and more appropriately-sized equipment.

FOOD PROCESSING AND PREPARATION

While the preceding remarks have been directed primarily to agriculture, most apply to food processing as well. Studies show that the

processing, packaging, distribution and transportation of food requires as much or more energy as growing the food itself. Much of the present processing and packaging is done in highly centralized operations.

The stage is being set for decentralizing important segments of food processing into smaller units that will be more labor-intensive, located nearer the consumer and using packaging which is less expensive and environmentally degradable. The recycling of metal containers and use of returnable bottles are two areas where this is already starting.

Food preparation is another big expender of energy: for example, refrigeration and cooking account for energy usage about equal to that of food processing.

INFORMATION AND TECHNOLOGY

A critical need today and the keystone to success in moving to smaller farms and smaller food processing units is information and technology more readily available and applied more effectively. By technology I mean knowhow – how to make two stalks of rice grow in place of one is know-how, or technology, as is the design of a crop dryer. Obviously technology extends over a vast range.

There is a massive, urgent and worldwide need in the agricultural community for finding information faster and in obtaining and using technologies more efficiently.

What I mean is the kind of information system that will tell a farmer why he should plant soybeans or some other crop instead of corn in a given situation, or how to use less water in irrigation, how to customize farm machinery, or provide diagrams and descriptions of solar heating devices and wind-powered electricity generation, or electrical troubleshooting for farm machinery, and so on.

"There is a massive, urgent and worldwide need in the agricultural community for finding information faster and in obtaining and using technologies more efficiently."

The agri-business sector needs a massive dose of technology and information supplied unlike this country has ever provided before. This need grows ever more urgent. At the start of this talk I alluded to my earlier experiences with the great depression and it's ironic that I now see agricultural income, in terms of what it will buy, at a level not far from that experienced in those dreary days.

Computer technology has advanced to the point where it can meet these information and technology transfer needs. Control Data's AGSERV, TECHNOTEC and PLATO computer-based education services are specifically responding to them today.

AGSERV is a more accurate and timely service for crop information that is being developed. It combines existing public agronomic and

weather information with our data plus that of a user to produce area unique reports and forecasts. In other words, when fully developed a farmer will be able to get a report or forecast whenever he wants it that is tailored to his area and his knowledge.

"When fully developed a farmer will be able to get a report or forecast whenever he wants it that is tailored to his area and his knowledge."

TECHNOTEC is a worldwide computer-based communications information and technology transfer system. Data bases on both agricultural information and technology are being built up. For example, if an improvement in irrigation is developed in Israel, information on it will be in the data base and farmers in the U.S. can search it out and learn about it.

PLATO CBE is for training and education. There are courses now available in farm management and many under development, such as courses in animal breeding, milk marketing, genetics, ration formulation, and so on.

Information, technology and education offerings are delivered via terminals that will be conveniently and economically accessible by every farmer or small agri-business person.

The information and technology in the TECHNOTEC data base can be accessed today via a low-cost terminal over a telephone line. It is feasible today for some individuals or a group of farm persons to lease or own and operate a low-cost terminal.

There are not yet enough CBE courses available to warrant home ownership of a PLATO terminal, so that delivery of education is best achieved now by PLATO terminals in cooperative offices, chamber of commerce offices, extension offices, and privately operated learning centers.

"It is feasible today for some individuals or a group of farm persons to lease or own and operate a low-cost terminal."

Control Data is implementing a program of achieving nationwide delivery of TECHNOTEC and PLATO CBE via those places. However, as soon as enough courseware is available, it will be in the economic interests of the average American farm family to own a PLATO terminal, both for education as well as for rapid access to information and technology. The courseware can be written within the next three or four years.

This increasing accessibility and availability of information, technology and computer-based education will by itself give great impetus to migration back to the small towns and farms by making it possible to reduce drastically the amount of travel required by rural people in seeking occupational, business and educational alternatives; for example, it will be feasible for many kinds of industrial work to be performed in the home or in small operations near by.

"The formation and operation of smaller units with appropriately scaled equipment should be encouraged as well as methods requiring a minimum of fossil fuels and involving more human labor."

But this impetus is not enough by itself. One important need is a set of national goals that support the development and use of alternatives to the present fossil fuel intensive, huge capital investment and environmentally destructive farming methods.

The formation and operation of smaller units with appropriately scaled equipment should be encouraged as well as methods requiring a minimum of fossil fuels and involving more human labor.

Research should be redirected to support these goals. Much of the research and development today primarily benefits only the large-scale farm using fossil fuel intensive, large capital equipment, labor-saving methods. Huge and automatic animal feedlots, gigantic tractors, multiple row tilling and planting machinery, and plants which have characteristics bred into them to best accommodate to the machinery are examples of this R&D.

"Tax incentives are needed to motivate those with technologies relevant to these tasks, to make them more widely available to those who need them."

There is growing evidence that crop yields are leveling off. This requires not only a substantial increase in the level of research but new directions as well. Of great importance is the establishment of cooperative research programs with other countries because the timely achievement of the goals will require a massive research effort far beyond the resources of any single country.

Developing Countries: Developing countries can make major contributions because virtually all of them have universities and institutes with research capabilities, particularly in the fields of agriculture and solar energy. The U.S. is committed to provide substantial aid to developing countries and cooperative programs can be far more acceptable and productive with developing countries contributing to problem

solutions, than unilateral aid that is too often ineffective, resented and viewed as charity.

Increased Cooperation: Also of vital importance is expanded cooperation among businesses engaged in agri-business and food processing to accelerate the technological innovation required to develop and build the many new equipments and processes required to establish smaller, decentralized plants less reliant on intensive use of fossil fuel energy. Tax incentives are needed to motivate those with technologies relevant to these tasks, to make them more widely available to those who need them. For example, a tax-free sale of technology should appeal to all concerned. There wouldn't be additional cost to the taxpayer, for without the incentive the sale wouldn't take place. Also, application of existing technology produces the end result sooner along with the attendant new jobs at less cost than developing the same technology from scratch.

SUMMARY

Establishing a program whereby agriculture and food processing resolutely move toward smaller units is not only the best one for agriculture and food processing, but such a program would contain major benefits for all sectors of society. It would provide for greater conservation of natural resources, better environmental protection, the increased availability of a life style of growing popularity, and the creation of a vast number of new jobs.

New job creation may be the most significant benefit of all because the unemployment problem will become more critical in the next ten years as another twenty million new jobs will be required, the largest increase in our history. Thirteen million were created in the last ten years. Then there are the further massive reductions in manufacturing jobs by industrial robots that will begin to come into widespread use in the 1980's.

National goals. More cooperation. Capital availability. And tax incentives. All are needed to establish a program to reach these objectives. But most important is the involvement by all sectors of society.

I am personally committed to help structure regional organizations that pull together and focus efforts in establishing and implementing the program.

"New job creation may be the most significant benefit of all because the unemployment problem will become more critical in the next ten years . . ."

I have had many meetings with leaders in business, government, education, labor unions, foundations and churches, to gain understanding and support. For example, later this month I will be speaking on this subject at the United Church World Ministries annual meeting and to a group of business leaders at a Minneapolis conference. There

is great interest and I am confident that a national program *will* become a reality.

A timetable of twenty years for achieving significant results appears reasonable. This is an estimate based on my experience in developing new concepts to the point where significant benefits are produced. For example, it has taken twenty years to bring computer-based education into fruition. The development of the technology and facilities for TECHNOTEC also took about as long.

"The vast majority see tomorrow as it is today, and find it unpleasant even to think about change. Change usually isn't as comfortable as the status quo."

The pattern of these and other significant developments with which I have been associated have also been similar in another respect – widespread skepticism in the early stages. In addition, one's sanity is questioned. And there are charges of recklessness. The vast majority see tomorrow as it is today, and find it unpleasant even to think about change. Change usually isn't as comfortable as the status quo.

But the status quo today isn't as comfortable as it used to be. There is deep concern and widespread uneasiness all over the world about unemployment, underemployment, energy, pollution, and other major societal problems. The old ways aren't working. That is increasingly obvious.

What isn't so obvious is why? But people are much more prone to listen these days. They exhibit less skepticism and more apparent willingness to adopt a new concept. In addition, there is a widespread and growing desire to volunteer personal time to gain understanding and to help find answers. Those factors strengthen my optimism that a national back-to-the countryside program will become a reality.

Harnessing Technology for Better Urban Living

William C. Norris
Chairman and Chief Executive Officer
Control Data Corporation

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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61

HARNESSING TECHNOLOGY FOR BETTER URBAN LIVING

Having been a speaker at this occasion before, I know that it is unnecessary to waste time on warming up the audience so I will plunge in by noting that central to my presentation are two facts: one is that since our major societal problems of employment, energy, cities and environment are inter-related, their solutions ought to be inter-related; the other significant fact is that millions of new jobs will come from the development and production of alternate sources of energy, from conservation of energy, from greater environmental protection and from building and rebuilding cities.

We have yet as a nation to recognize these inter-relationships adequately and make serious efforts to establish national, regional, state and city policies and procedures for exploiting them effectively.

Until we do there will be continuing deterioration in our quality of life as major societal problems grow to crisis proportions.

"...since our major societal problems of employment, energy, cities and environment are inter-related, their solutions ought to be inter-related..."

Rather than continuing to permit further deterioration, it is time to take a new approach and address these major problems as business opportunities – to convert solutions into growth industries of the future that provide the new jobs that are so badly needed.

One of the most urgent of our many societal problems is inner-city blight, even though there is a host of new and advancing technologies which, if properly harnessed, can vastly improve inner-city living and launch a new growth industry dedicated to building and rebuilding cities.

My presentation today will suggest ways that this can be achieved. After outlining some guiding principles and procedures, I will identify a number of applicable advancing technologies and related business opportunities. Very little of what I will be talking about is theoretical abstraction. Rather, it represents past experience and ongoing programs. Our society has grown so complex that it is virtually useless merely to advocate desirable change. One must, wherever possible, implement it to sufficient extent to demonstrate the benefits. That is being done not only by my company, but by other organizations in many important areas, and I will be drawing from those results today.

These comments are addressed to you as business persons of the future who will have broken from the present narrow, largely self-serving and almost blind preoccupation with immediate bottom line profit and instead are seeking business opportunities by helping to solve societal problems. Important orientation in planning the products and services of your businesses will be gained by participating in community planning and other cooperative activities involving all segments of society. It is my conviction that with this approach the profitability of

your businesses will at least equal today's levels or possibly exceed them, because offerings based on meeting societal needs will inherently enjoy the broadest and most consistent demand.

The initiative then for building and rebuilding cities should come from the business sector by providing the leadership for planning, managing and implementing the required programs in cooperation with government, universities, labor unions, religious organizations and other segments of society.

These programs should be planned within a national framework with appropriate cost-sharing between government and business.

NATIONAL FRAMEWORK

What is meant by a national framework? Simplistically, it is the assembly of information on replicable technologies that provide essential elements of quality urban living. The problems of the South Bronx are essentially those of inner Detroit. Solutions in one city should apply to another; today, one city doesn't know what worked and what didn't work in another.

Even worse, cities across the country are repeating the same mistakes. There has been an inordinate amount of bad replication among cities because there has been too little long range planning research and experimental development to guide urban development and growth. There has also been great hesitancy in trying creative and experimental alternatives to the traditional methods of meeting urban needs on an adequate scale. This is in sharp contrast to business and industry where plans are based on research, experimental development and model testing – keystones that underlie the vast industrial growth that has taken place in the past fifty years.

"...there has been too little long range planning research and experimental development to guide urban development and growth. There has also been great hesitancy in trying creative and experimental alternatives..."

On the other hand, in recent years there have been several small-scale urban models, constructed by visionaries, that are based on advancing technologies drawn from many fields. Many of the technologies are proven. Others are in the developmental stage. But the models, as promising as they are, have yet to be applied on a scale that is meaningful enough.

To facilitate the establishment of a national framework we need to build one or more new cities incorporating these technologies on a large enough scale to demonstrate conclusively their effectiveness. At the same time, several cities should start programs to rebuild individual communities incorporating new technologies for better living. I

like to call the new city an *"innovative city"* and a rebuilt inner-city community an *"innovative community"*.

INNOVATIVE CITY

The main advantage of an innovative city is that it can be built with very few of the constraints inherent in an existing city, thus permitting a bold approach to urban living based on renewable energy technologies. Much of the technology is available to create a city which generates a high percentage of its own energy, recycles wastes, grows food, and provides more efficient transportation, education and health care.

A minimum size for a conclusive demonstration might be of the order of one thousand households. Costs would vary widely, depending upon design, but a ballpark number is $200 million. I will come back to the matter of financing later.

"...an innovative city can be built with very few of the constraints inherent in an existing city, thus permitting a bold approach to urban living based on renewable energy technologies..."

INNOVATIVE COMMUNITY

A decade or more will be required for an innovative city to progress far enough to demonstrate successful application of policies and technologies of improved urban living.

To delay massive and widespread efforts to start revitalizing inner cities for a decade would be intolerable, and unnecessary, because new technologies can be introduced through new structures and systems or modification of existing structures and systems to effect more immediate and substantial improvement. So we must move ahead aggressively with innovative communities – many communities are planning to rebuild, but most plans at present are confined to housing refurbishment and/or new construction in the conventional mode.

FINANCING

Given the urgent need and much applicable technology, how do we proceed to plan, finance and implement the programs? Let me address financing first, because it is mind-boggling unless it is approached realistically. The key is cost-sharing between the government and the private sector. Too often the financial burden of rebuilding our cities is viewed as belonging primarily to government. With government already overloaded with commitments, that is clearly not the answer. Instead, the main burden has to be in the private sector, but with substantial assistance from government, both local and federal.

More specifically, the federal government should underwrite the cost of completing the development of needed individual technologies and

S4

integration into a holistic approach. Construction costs should be shared. However, the cost of refurbishing existing structures should be financed mainly by the private sector. The new technologies that are developed at federal expense would be available for other cities to use as appropriate.

PLANNING

Turning now to planning, it should be noted first that any plan to build or rebuild must be based on providing job opportunities to the inhabitants. It has been proven that without an adequate number of jobs, a rebuilt area will only deteriorate again because of the inability of unemployed residents to pay rent, buy or maintain homes, get access to health care, food, transportation and so on. The alternative of replacing the poor with the more affluent, only shifts the problem to another area.

Jobs and profit-seeking enterprises will provide the key to the process of revitalization. Jobs are the most fundamental need around which all political forces, residents, community institutions and national resources can be coalesced. Jobs will fuel the energies of revitalization.

Small enterprises will play an important role for rebuilding neighborhoods, commercial centers, transportation systems and for providing health and human services. The revitalization process must be flexible, dynamic, responding, building. Participation in enterprises gives control to residents of the inner-city and provides them the long-absent economic opportunity and incentives for success. Enterprises will provide the means for residents to turn to each other for the resources they need to participate in the planning, building and servicing of a vital community. And a revitalization process founded on diverse profitable enterprises rather than dependent upon a host of public programs will be a principal means of rebuilding a community which can become self sufficient and responsive to changing needs from within.

"Participation in enterprises gives control to residents of the inner-city and provides them the long-absent economic opportunity and incentives for success."

Obviously revitalization plans will vary widely, but each must address the broad categories of job creation; better knowledge and education systems; energy supply and conservation; resident participation; enterprise formation; housing demolition, renovation, construction, management and maintenance; health and social services delivery; security; transportation; waste recycling; public works; parks and open spaces.

An inner-city rebuilding plan will require comprehensive reinvestment, encompassing diverse problems, resulting in a holistic living/working environment, with job considerations woven into every aspect of the plan.

Because of the many and diverse factors to be considered I will talk next about a better living/working environment restricted mainly to housing and human services considerations. This scenario then will serve later as a setting for emphasizing the six fundamental components of any plan; jobs, knowledge, education, energy, resident participation and small business. To ignore one or more of these is to repeat failures of the past.

Housing: The housing problems must be attacked at the neighborhood scale. One modest-sized neighborhood of 2,000 homes with an average fair market value of $30,000 represents a capital asset of $60 million. At present there is no organized system to manage that asset although the quality of the whole neighborhood determines the value of the individual home.

It is also useful to think of neighborhoods in terms of a cycle consisting of construction, deterioration and maintenance, reconstruction, deterioration and maintenance, reconstruction, and so on. Depending on the type of the initial construction, this cycle may turn several times and with differing frequency. Or, after one or two turns it may be ended – with the land cleared and replacement taking place, with new residential dwellings or with other uses.

"...A broad replacement of entire obsolescent neighborhoods is needed..."

Neighborhood revitalization, then, must be a recasting of several strategies. Programs of maintenance and renovation are needed at the neighborhood scale where clusters of contiguous neighborhoods are properly managed to maximize the return on capital investment in those areas whose productive life is not yet spent. A broad replacement of entire obsolescent neighborhoods is needed – at a scale where the full force of new construction technology can be applied.

The system for accomplishing this will be a variety of new enterprises modeled on today's community development corporations, tenant management corporations, townhouse management corporations and similar enterprises that have been proven effective in serving an aggregated housing market.

Human Services: The burgeoning demand for human services is another force to be channeled into urban revitalization. Massive federal appropriations for human services have come with neither a marketplace framework nor coordinated management. Delivery through government bureaus epitomizes the unresponsiveness of monopolistic structures, and fragmentation has frustrated even the best attempts to treat the whole person.

There is now an unprecedented opportunity to recast the human service system with a variety of new technologies and delivery capabilities. The first step is to diversify the delivery system, building on the foundations of a purchase-of-service approach. We must move from a "grant-in-aid" strategy at the city or county level – which merely ex-

tends the reach of public bureaus – to a purchase arrangement . . . providing local government the technology to manage such a system where many services are still delivered by non-profit organizations but an increasing number are delivered by private businesses. One technology to facilitate this is computerized data bases for immediate, comprehensive information and referral services to health care, housing, child care, counseling employment, chemical dependency services, and others; another is a computerized management system that can individually diagnose and prescribe services which empower each person to better understand his needs and to control and procure the appropriate help from a marketplace of comprehensive services.

After establishing a responsive, private-enterprise-based market structure through purchase of service, improving access to the market, and developing the ability to tailor services to the needs of the individual, we need to move away from a focus on the disadvantaged as the primary consumers to a community-wide purview for human services. Through a decentralized delivery system which is responsive to individual need, human services can be made available to all residents of the community. Those who cannot afford to pay will be provided vouchers which the vendor redeems at city hall. This expansion provides a fundamental opportunity to enhance the vitality of the community, and creates a new spectrum of professional and paraprofessional human service jobs for community residents.

Reform of health care is another essential ingredient to the urban revitalization effort. The current system harbors incentives for doctors to over-prescribe, for hospitals to over-equip, and for patients to be overdependent on treatment. The emergence of the health maintenance organization, with its incentives to practice preventive health care, demonstrates that better lower cost health care can be achieved through a restructuring of the delivery system and the utilization of extensive health care education.

"New technologies for access to knowledge and information will weave the fabric of a holistic living/working environment."

New technologies for access to knowledge and information will weave the fabric of a holistic living/working environment. Individualized computer-based education (CBE) technology which is now available will free the individual from the institutional constraints of the traditional education setting by making high quality education available wherever it is needed throughout the community. More than providing improved accessibility, each user will be able to interface with an adcanced communication network that will form the foundation of a new intellectural environment, stimulating creative achievement and cooperation in many areas of community endeavor.

Other Technologies: As obsolete neighborhoods are replaced by new construction, technologies will be incorporated to integrate the man-made environment with the natural environment. These technologies

will exploit alternative energy sources, attractive and efficient underground construction methods, waste recycling, communication, transportation, agriculture and recreation. Many of the technologies to achieve this are available now.

The construction of new neighborhoods will also permit experiments with new social and structural concepts for serving the elderly, the single parent family, neighborhood-scale commercial enterprise, and decentralized human service delivery. New options for "urban agriculture" will be exploited in conjunction with underground housing technology, with application of the greenhouse effect both for solar energy collection and plant production, and extensive use of new methods of food production.

Implementation: Revitalization must be energized by an infusion of management skills, technology and capital. The effort is substantial in scale and breadth. It must draw from the widest range of technologies. It must be founded on large-scale management knowhow. It must be financed by substantial capital commitments from external sources, public and private, in all forms – grants, loans, equity investments – through the broadest range of public and private financing instruments.

"New options for 'urban agriculture' will be exploited in conjunction with underground housing technology..."

These resources do not exist in an inner city. They must be marshalled externally and systematically infused into the inner city to energize the revitalization process.

A consortium should be created by a number of major corporations to provide the mechanism to assemble the resources and manage projects of this type. A consortium can provide expertise in each vital area. Large corporations best understand the processes of job creation, enterprise formation, capital investment, production, maintenance and servicing. They are practiced in the skills of large scale project management of raising investment capital, and in structuring and providing supportive resources necessary for enterprises to succeed and grow.

COMPONENTS FOR SUCCESS

Having outlined a new approach to urban innovation along with a scenario for planning, management and implementation I will review the six fundamental components that such efforts must include if they are to succeed.

Jobs: The creation of an adequate number of jobs with appropriate skill levels is not only the key to success of any inner-city plan, but the single most difficult and time-consuming task. Even more important, it is the element that must set the pace for the others.

The main methods of providing jobs are to induce existing businesses

to relocate or expand into the inner-city, and create new businesses. All methods should be used, but business expansion and new business formation should be emphasized because relocation will normally result in merely shifting jobs from one community to another.

"The main methods of providing jobs are to induce existing businesses to relocate or expand into the inner-city, and create new businesses.

Knowledge: Integral to the success of job creation and better urban living are effective knowledge and better education systems.

A more effective knowledge system is a better means of locating needed knowledge; i.e., knowhow or technology. I should hasten to point out that information and knowledge are not the same. Our libraries and publications are better geared to furnishing information than knowledge. As a result, as previously mentioned, one city doesn't know what worked and what didn't work in another city. This is equally true for neighborhoods within a city.

You may have heard of "sweat equity." This is the approach where residents in a neighborhood – a city block or two – work as volunteers on refurbishing housing. The phrase was coined in the Bronx a few years ago by a priest, Monsignor Fox. He organized work teams on weekends – fifty to sixty people to renovate a tenement building. The project took five years to complete and was highly successful. Since then some forty other "sweat equity" projects have been undertaken in New York City.

"You may have heard of 'sweat equity.' "

According to Monsignor Fox, there has been very little knowledge relative to the most efficient renovative methods used by one group transferred to another. There hasn't been time or other resources available to document the knowledge gained in the course of the work. And so, one project lacks information about the knowledge gained by the others.

More efficient transfer of knowledge can now be achieved through the use of the computer, operating in a worldwide communications network. Knowledge is stored in the computer memory and is easily accessed by terminals virtually any place in the world.

This is another of the host of new and advancing technologies that I mentioned earlier.

Education: An improved education system is a corollary of an effective knowledge system. Deficiencies in the present educational system is one of the root causes of the high rate of minority youth unemployment in our inner cities. Equally important is adult continuing educa-

tion to train and retrain workers in consonance with the ever changing products and services needed by society.

There are now available advancing technologies that have the power to revolutionize the quality, productivity and availability of education.

These are principally the electronic ones – television, radio, audio and videotapes and disks, computers, computer conferencing, cable TV, microwave and satellite transmissions, and computer-based education.

"There are now available advancing technologies that have the power to revolutionize the quality, productivity and availability of education."

These technologies can be assembled to provide the required educational facilities and are further examples of the host of new technologies applicable to better urban living.

Energy: A fourth component which is fundamental to urban innovation is energy conservation and the adoption of alternate sources of energy. Future vitality of urban areas will be directly dependent upon sufficient, affordable sources to provide energy for space heating, transportation, and other needs. The implications are profound for redesign of the urban infrastructure. Any urban innovation strategy which fails to integrate effective energy considerations will be obsolete before it is built.

Resident Participation: Resident participation is the fifth component. Effort to rebuild an inner-city area must be rooted in participation of residents. From his two decades of experience in the Bronx, Monsignor Fox has concluded that personal investment of residents is an indispensible factor in generating the motivation and energy necessary for long term success. The urban power brokers will not easily relinquish control yet they will be hard pressed to manipulate residents who have organized to implement the rebuilding effort and who have a personal investment in their destiny.

Monsignor Fox also has pointed out that revitalization efforts are long term and will require new and sustained behaviors by residents far in excess of what they will initially anticipate. Therefore it is imperative that the effort be complemented by a program of horizontal human development. Such a program must establish peer support systems that empower the residents to become self-actualized and to take full advantage of the new resources which will be infused into their community.

Small Business: The sixth fundamental component is small business. As stated earlier, small businesses provide the essence of self-determination, and may be the only means for inner-city residents to overcome the paralyzing alienation, cynicism and despair which they have acquired through the years. In a moment, I will elaborate on how these businesses can be formed.

COOPERATION FOR URBAN INNOVATION

However, next I want to address the issue of cooperation. How will we marshal the diverse resources that are essential to overall solutions? How can we harness the new and advancing technologies to get them usefully employed?

The theme of cooperation has run throughout my remarks, from the creation of a national framework, and sharing the burden of financing, to the formation of a corporate consortium to plan and manage major urban innovation, to grass roots resident participation in carrying out such innovation.

"There must be a pulling together of these efforts at a regional or state level to identify, prioritize and facilitate problem solutions with the implementation being done in the traditional manner in the private sector."

COOPERATION OFFICE

Yet no ongoing mechanism exists for sustained cooperation among societal segments on large scale efforts. We have been unable to provide a focus for the myriad of individuals, and community organizations now engaged in inner city revitalization, fostering the start-up of new businesses, helping to finance new plant construction and other important efforts that help solve major problems and create jobs in the process. But these efforts are usually too small in scale, too fragmented and unnecessarily duplicative. Involvement of big business, labor unions, churches, university and local government units is inadequate. They are micro solutions to macro societal problems. These are massive problems requiring massive resources and entailing many controversial issues.

There must be a pulling together of these efforts at a regional or state level to identify, prioritize and facilitate problem solutions with the implementation being done in the traditional manner in the private sector.

The major focus must be on jobs. The reason is twofold. Jobs are the most powerful means for self-actualization and hence for energizing the processes of revitalization. And jobs are something everyone agrees we need more of. With a strong shared concern for job creation, we have a firm basis for cooperation.

Although the central thrust is solving unemployment, the new jobs will come from the formation and growth of enterprises which can solve other pressing problems. Put another way, the job creation mission of the cooperation office will be integrated with the need for new solutions to societal problems; new solutions will result in the business opportunities which will create new jobs. As I described in my scenario for urban innovation, the inner-city offers tremendous opportunity for the formation of new, problem-solving enterprises.

"Regional or state cooperation offices would be staffed mostly by volunteers from all segments of society."

Regional or state cooperation offices would be staffed mostly by volunteers from all segments of society. The cooperation office would promote job creation first by identifying appropriate programs and then by motivating businesses to assume implementation leadership with support from government and other segments of society.

More specific functions of the cooperation office would include:

1. Identifying and selecting appropriate societal problems for attack in cooperation with community organizations.
2. Encouraging businesses to assume the leadership of projects for solving the problems, and encouraging cooperation among businesses and other sectors of society in implementing solutions.
3. Stimulating companies to make their technologies available to others for non-competitive uses.
4. Assisting aspiring entrepreneurs and inventors in preparation and evaluation of business plans and start-up, together with identification of financing sources.
5. Promoting state and federal legislation as required.

The area cooperation office would be privately operated and manned by a small permanent staff. Professional expertise needed for program selection and promotion would be filled by volunteers and by retirees.

The cost of supporting the permanent staff and a limited number of research studies would be borne by annual contributions from the participating organizations.

The modus operandi of an area cooperation office is best explained by reviewing three programs that might be undertaken.

Urban Projects: Obviously one major program is business opportunities addressing the subject at hand – better urban living.

The area cooperation office would work with community groups in planning specific programs and facilitating their implementation. In other words, make it happen on the required scale.

Solar Energy: Fostering additional activity in the development of alternate sources of energy is another program. Concentration on the development of solar sources would be particularly appropriate for the upper midwest because of its many potential uses in urban revitalization agriculture.

The approach is to identify the projects with the best potential and then community leaders in the area cooperation office would meet with the top managements of the best qualified companies to induce them to undertake implementation. Where the risk is too high, or financial commitments are beyond the means of individual com-

panies, then joint ventures should be encouraged – either by collaboration between existing companies or through the formation of new companies. For example, Battelle Institute and Northwestern Mutual Life Insurance are cooperating in a solar energy irrigation project.

"The most basic program is that of fostering the start-up of new, small enterprises."

Entrepreneurial Enterprise: The most basic program is that of fostering the start-up of new, small enterprises. A new business entity means new jobs. An inventor has an idea for a new product or service, and wants to start a company to develop and market it. Financial backing from the usual sources is not available. Venture capitalists are ordinarily not interested in unproven ideas. Money sources are approached for furnishing the initial capital. Since there is substantial risk, the total amount required is spread among a large number of investors. Investors include all types of businesses, labor unions, religious organizations and city and county organizations.

While there are other programs that could be referenced, the ones I've described suffice to further illustrate the inter-relationships among societal problems and the fact that solutions of most problems are beyond the reach of a single community – or even large city – yet each can better contribute and benefit if there is an established mechanism for cooperation.

SMALL BUSINESS OPPORTUNITIES

My last major point is the subject of small business.

Earlier I talked about the importance of small enterprises in implementing urban programs and a number of opportunities for small business were mentioned. Because of the great importance of small business in creating and maintaining an attractive urban society, I will add to the list and elaborate on some previously mentioned.

Technical Resource Center: One of the most urgent needs and in turn best business opportunities is in providing numerous types of assistance to small businesses. An effective means of achieving this is with a business called a "technical resource center", that provides professional consulting help and offers shared facilities and services for small companies.

A cluster of buildings containing flexible laboratory and office space is subdivided and leased to small businesses that are starting up. Also contained within the buildings are centrally shared facilities and services, including library, model shop, drafting services, purchasing, clean rooms, and a complete range of computer services, including technology transfer services and computer based education.

Economies of scale will make it possible to provide occupants needed facilities and services for considerably lower cost than if each provided them himself. Benefits will also be obtained from the enhanced environment for peer interchange.

Computer-based education provides enhanced collaboration and technology interchange with widely dispersed universities and government laboratories.

In addition to full-time professional staff members, a large roster of outside professional consultants could be maintained.

There will be many variations of the technical resource center concept. Some will provide only professional consulting to small companies to help in developing and marketing new products and services.

Social Services: As mentioned earlier, the broad sector of human services needs provides an excellent foundation for expanded urban enterprises. All indications suggest a continuing dramatic growth in the demand for human services. Delivery of these services through independent agencies instead of government bureaus will facilitate consumer choice and adaptation of innovative arrangements through the use of vouchers, purchase of service contracts, and fee-for-service offerings.

"New technologies for housing construction, renovation, retrofitting, and maintenance are becoming available which will be the basis for many small companies offering specialized and comprehensive services throughout the inner-city."

Housing: New technologies for housing construction, renovation, retrofitting, and maintenance are becoming available which will be the basis for many small companies offering specialized and comprehensive services throughout the inner-city.

Training: The field of training offers small business many opportunities. With the advent of computer-based education, small companies will be able to obtain high quality CBE courseware covering basic subjects, such as chemistry, physics, electronics, management and adapt them to new fields as they develop – such as waste recycling and alternate energy equipment installation and maintenance, urban farming and new types of building construction and maintenance.

"Small business will find many products to manufacture and market in the field of solar energy."

Solar Energy: Small business will find many products to manufacture and market in the field of solar energy. There are already some two hundred solar energy companies in the United States, many of them small. As solar energy becomes more widely used there will be additional opportunities in the installation and maintenance of solar energy systems.

Microcomputers: Microcomputers is another area. They will be widely used in controlling environments in many different types of structures where alternative sources of energy are used and in water and waste recycling. Computer terminals will become widely used in the home, and so on. Small businesses can install and maintain these devices.

"Further ahead in the future there will be opportunities in urban farming."

Urban Farming: Further ahead in the future there will be opportunities in urban farming. As fossil fuel costs increase along with growing shortages of non-renewable resources, the production of vegetables in open spaces and under cover will become economically attractive using renewable energy sources, hydroponic and aeroponic food growing techniques, recycled water, waste heat, carbon dioxide from smokestacks, etc.

CONCLUSION

In concluding, rather than summarizing what I have been saying, I will make two observations – one relating to the Minnesota experimental city project and the other to a business philosophy.

Minnesota Experimental City: Some of you may not be aware of the Minnesota experimental city project which was started in 1965 under the auspices of the University of Minnesota. The objective was to develop a design for a city that afforded alternatives for significant improvement in urban living; e.g., a basic transport system which was to be a high capacity automated roadway and the public utilities of water, electricity, fuels, heat sewage, solid waste were to be provided by an integrated system designed to be highly efficient and capable of accommodating alternative sources of energy. Advanced concepts were incorporated into the community's educational and health care system.

The state of Minnesota created a special state authority to assist in planning, and a number of corporations provided part of the funding. In spite of the considerable state government and private support, the project stalemated because of the absence of federal urban development policies and lack of widespread public perception of the benefits to be ultimately derived. However, much was learned from the effort which will contribute to ongoing programs.

Business Philosophy: Finally, the business philosophy is a simple one – "There is no security in this world, only opportunity". I'm not sure of the origin of this wisdom, but it has served me well and I suggest that it will do as much for you as you seek business opportunities in solutions to societal problems. Not only will you be rewarded, but you will be helping to assure the preservation of our private enterprise system. Society will not tolerate indefinitely the ever-rising costs of living, unemployment, underemployment, urban blight, ever-

increasing energy problems, environmental degradation and inadequate education. The message is clear. Private enterprise will solve these problems or another system will take its place. If you don't provide the initiative and leadership in the years ahead for our business system, who will?

"The message is clear. Private enterprise will solve these problems or another system will take its place. If you don't provide the initiative and leadership in the years ahead for our business system, who will?"

Technology for Improving the Image of Business

William C. Norris
Chairman and Chief Executive Officer
Control Data Corporation

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

This address was given at a seminar organized by The Minnesota Project on Corporate Responsibility at The Spring Hill Conference Center, Long Lake, Minnesota, on November 16, 1977.

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A current issue of great importance to business is that of improving its public image. There has been a growing awareness among business executives during the past ten years of the seriousness of the adverse public opinion of business. Programs have been launched to improve it but favorable results are not widely discernible.

It is appropriate here to look at the public's perception of business and what business has been doing to improve its public image. Proposals will be made describing more effective approaches business can make to enhance its standing.

PUBLIC PERCEPTION

There are too many people who believe to one degree or another that business is predatory, rapacious and indifferent to societal needs. In other words, that it will do most anything for a buck.

Overstated? Not much! A growing body of literature and my own experience support that conclusion. For example, whenever an action by my company is publicized that on the surface does not appear to be in the public interest, even though it may be, my fan mail quote – unquote – increases. Invariably the response is condemnation – never "would you please explain?" Regardless of the virulence of the condemnation I always personally answer as thoroughly as is practical by letter. Usually there is no response. The few exceptions are almost always rejections with no apparent attempt at rational analysis.

"There are too many people who believe to one degree or another that business is predatory, rapacious and indifferent to societal needs."

There is little to be gained by dwelling on the exact nature of the public's view of business due to its complexity and the infinite number of factors shaping it. But that it is of serious and widespread concern to business is not in question. Witness that virtually every large corporation devotes a section of its annual report to social responsibility and the increase in the number of specific activities in recent years with the objective of improving the corporate image.

WHAT IS BEING DONE?

Contributions: The most common business response to social concerns is the charitable contribution. In recent years there has been a noticeable increase by most companies. Five percent of pre-tax earnings is the permissible Federal write-off and is considered to be a laudatory level for business. An increasing number are reaching that level.

There are great benefits being derived by society from these contributions. Unfortunately, monetary contribution alone will not, in the long run, offset adverse opinion. One reason appears to be that large contributions are expected from business. An increased contribution one

year raises expectations for even more the next. Corporate giving for decades on an increasing scale hasn't produced commensurate improvement in the business image.

"Unfortunately, monetary contribution alone will not, in the long run, offset adverse opinion."

With Respect to Ethical Conduct: Actions by corporations in recent years to adopt and enforce stricter codes of conduct may in time provide image enhancements; however, it will probably be quite a few years before there are visible results because the public believes that it took a government clubbing to get business to act.

Economic Education: Furthering economic education is another type of action taken by a number of companies. There have been many good programs explaining our economic system and the advantages of free enterprise. Follow-up surveys show that even though a better understanding of the system is achieved that there isn't a measurable improvement in the attitude toward business. The reason appears to be as suggested earlier: the public perceives business as mostly occupied greedily in making profits with too little concern for the needs of society.

Direct Action to Solve Social Problems: There are a number of companies that are directly, or in cooperation with other organizations, addressing societal problems. One example of a cooperative effort between business and government is the 70001 program that provides a means by which out-of-school unemployed youth can get immediate employment along with on-the-job training and development of self-confidence and motivation to enter and advance in the field of marketing and distribution. The program is supported by government funds that are administered by 70001 Ltd., a non-profit organization. There is extensive cooperation by the American Retail Federation and related national business firms. The 70001 program is producing significant results, but it is limited to the retail field, with emphasis on personnel guidance and counseling. Unfortunately, it does not deal with the huge bulk of the more severely disadvantaged. Even so, it is a good start and it does show that meaningful cooperation can occur among major segments of society.

"...the public perceives business as mostly occupied greedily in making profits with too little concern for the needs of society."

There are also companies that have taken the initiative to improve inner-city housing.

In our community General Mills and Honeywell have become known for their efforts to refurbish inner-city housing. Honeywell is nearing fifty house restorations in South Minneapolis and General Mills' efforts are nearly as extensive. Our Commercial Credit subsidiary is engaged in a similar project in Baltimore.

Another small group of companies have established MESBICS (equity financing for minority-owned small business) and SBICS for all types of small business. The investments in small business are made with the objective of ultimately receiving a reasonable return.

About ten years ago my company adopted a policy of looking at pressing social problems as business opportunities. Our first action was a program of putting plants in depressed areas. This program has proven to be successful in that the plants provide employment in local areas and are equal to or above the average efficiency of all plants. There are also major programs for developing products and services to improve health care and education and to aid small business.

"About ten years ago my company adopted a policy of looking at pressing social problems as business opportunities."

Such programs as these produce highly positive results for business within the local communities in which they are performed. Neither the number nor the accomplished results are yet great enough to achieve widespread awareness, but they are an important part of the overall approach that will greatly enhance the business image.

FOUR-PART METHODOLOGY

With that background in place, I would like to outline some ways whereby business can improve not only its image, but in the long run its profitability.

Essentially, the methodology is four-pronged – first, stop practices that are completely within the control of individual companies and that detract from the business image but would not be economically burdensome to stop. Second, change to a business strategy with more emphasis on looking at how present products serve society and how product improvements and new products can serve better. Third, adopt a more cooperative stance within the business community and with other segments of society. Fourth, and most important, assume the leadership for achieving more timely solutions to major societal problems. Let me briefly elaborate.

"...ways whereby business can improve not only its image, but in the long run its profitability."

STOPPING NEGATIVE ACTIVITY

First, with respect to image detractions, many products and processes are causing pollution and health hazards where solutions are costly, complex and time-consuming and involve many segments of society. Obviously, in these cases, each business must be practical and cooperative in helping to arrive at solutions, and business is improving in this regard.

On the other hand, there are detracting situations that are under the control of individual companies where underlying causes can be eliminated without undue economic burden. Some examples are unethical practices and unwanted takeovers. Unethical practices are apparently receiving adequate attention. That is not so for unwanted takeovers.

Unwanted Takeovers: The capture of one company by another despite resistance of the former, benefits only the aggressor and often at the expense of society.

The real objectives of a takeover are seldom revealed. Obviously the aggressor sees such opportunities as increased profits through plant consolidations, wider product distribution, more efficient use of his existing marketing organization, needed technological capabilities, and so on.

Inevitably, pursuit of these objectives brings adverse consequences that can include amputation of employee careers, damage to the existing business, destruction of job-creating resources, stifling of creativity, enterprise and competition.

"The capture of one company by another despite resistance of the former, benefits only the aggressor and often at the expense of society."

The aggressor, on the other hand, almost always could have achieved his profit-and-growth-oriented objectives in another way – frequently as good or better for him – through cooperative techniques that avoid the destructive effects on others, including the news headlines that degrade the image of business.

Most large companies to their credit do not engage in unwanted takeovers, so we have a situation where all business suffers because of the bully-boy acts of a few.

While a number of states have enacted laws to make unwanted takeovers more difficult to achieve – and these are of some benefit – the most practical means of elimination is to develop a strong consensus within the business community itself against them.

LEADERSHIP IN SOLVING SOCIETAL PROBLEMS

Turning now to business leadership in solving major societal prob-

lems, it should first be noted that this proposed approach is subject to modification and improvement. Also, it should be emphasized that I am *not* proposing that business assume the entire responsibility for solving societal problems, but that business, primarily big business, provide the leadership and the management. More specifically, that plans for positive solutions be formulated through cooperative efforts by all major segments of society with the assistance and guidance of business – with actual program implementation by the traditional methods such as companies acting on their own initiatives, or performing government contracts, or through joint ventures where risks are shared between industry and government.

"I am *not* proposing that business assume the entire responsibility for solving societal problems, but that business, primarily big business, provide the leadership and the management."

The major problems include the achievement of alternate sources of energy, improvement in energy conservation, greater environmental protection, new materials, less costly and increased food production, more efficient water conservation, revitalization of inner cities, better education, better health care, and improved productivity.

Solutions to these major problems would provide badly needed new jobs. Not only are more jobs needed, but almost as important, more skilled jobs and reduction of unemployment among the young. The unemployment problem will become even more critical as in the next 10 years another 20 million new jobs will be required. This would be the largest increase of any decade in our history; 13 million were created in the last 10 years.

The achievement of alternate sources of energy is closely related to reducing unemployment and in important respects as urgent. Our economy is utterly dependent on cheap and readily available gas and oil for energy. Within 20 years or so, world production will begin to fall off. Considering that 15 to 30 years are required to get meaningful results from the average new development, there is precious little time available to avoid disaster.

"These are massive problems that require technological resources that no single country possesses, not even the United States."

Lagging Progress: Progress in solving these major problems is woefully slow. One reason is that for the first time in many generations the United States does not have the technological resources to solve

its many urgent problems in a timely manner. These are massive problems that require technological resources that no single country possesses, not even the United States. Yet there is an enormous amount of unplanned duplication of technical effort throughout the industrial world, and vast amounts of existing technologies are underutilized.

Another major reason for lack of progress is that business has been concerned almost exclusively with what it can sell that will provide adequate return on investment in research and development. As a consequence, society is getting from business the products and services that meet the business test rather than those that address the more fundamental needs of society.

Still another reason is lack of widespread understanding of the central role of technology in the economic process, and particularly that new jobs are derived from the application of technology.

Moreover, just the use of the word "technology" often causes people to turn away with the attitude that technology is for the long-hairs. Or worse, technology is seen by some as a synonym for pollution of our environment.

"...another reason is lack of widespread understanding of the central role of technology in the economic process, and particularly that new jobs are derived from the application of technology."

Unemployment: There is a deeply-rooted and growing concern in our country, and indeed worldwide, over unemployment and efforts, albeit not very effective, are being made toward more permanent and long-range solutions as opposed to the short-term job corps/public works type of stimulant.

Most of the effort aimed at longer range solutions has been concentrated on facilitating the formation, development and more efficient operation of small businesses for achieving economic growth and creating new jobs.

One such effort with partial funding by the National Science Foundation, has resulted in innovation centers at MIT, Carnegie-Mellon and Oregon State.

In another, the Small Business Administration made $300,000 available in 1977 to test the concept of establishing Small Business Development Centers at eight cooperating universities to aid small businesses with their management problems, particularly those involved in starting new companies and in finding and applying technologies required for new or improved products and services in existing companies.

There have been a number of organizations similar to the Small Business Development Center established at the state level in Maine, Connecticut, Pennsylvania and a few other states.

All of these efforts are successful but on too small a scale. They do not involve big business, local labor unions and governmental units sufficiently and they have low visibility; they are micro solutions to macro problems.

AREA COOPERATION OFFICE

There is, of course, no scarcity of organizations engaged in addressing societal problems. Many are talented and have storehouses of valuable information. Their main outputs are reports, often excellent, but little action usually results.

What is needed is a pulling together of available resources by community leaders at a regional or state level to identify, prioritize and facilitate solutions. And as previously mentioned, the actual implementation of problem solutions would be done in the traditional manner.

The organization to help accomplish this might be called the "Area Cooperation Office." This would be a highly visible activity involving leaders from all segments of society. Its principal objective would be that of identifying and helping to promote means of creating new jobs, by encouraging businesses, particularly large corporations, to assume leadership in programs to solve major societal problems.

"What is needed is a pulling together of available resources by community leaders at a regional or state level to identify, prioritize and facilitate solutions."

More specific functions would include:

1. Selection of appropriate societal problems for attack.
2. Encouragement of businesses to assume the leadership of projects for solving the problems.
3. Encouragement of cooperation among businesses and between business and universities in implementing the projects.
4. Dissemination of information on research, development, services and products required to help meet major societal needs.
5. Stimulation of companies to make their technologies available to others for non-competitive uses.
6. Assistance to aspiring entrepreneurs and inventors in evaluation and preparation of business plans and start up, together with identification of financing sources.
7. Promotion of state and federal legislation as required.

The Area Cooperation Office would be privately operated and manned by a small permanent staff. Professional expertise needed for program selection and promotion would be filled by volunteers and by retirees.

The cost of supporting the permanent staff and a limited number of research studies would be borne by annual contributions from the participating organizations. Costs of any research study requiring a very large effort would be covered through federal or state government grants.

POTENTIAL PROGRAMS

The modus operandi of an Area Cooperation Office is best explained by reviewing a number of programs that might be undertaken.

Entrepreneurial Enterprise: The simplest, yet an important program is that of fostering the start-up of new, small enterprises. A new business entity means new jobs. An inventor has an idea for a new product or service, and wants to start a company to develop and market it. Financial backing from the usual sources is not available. Venture capitalists are ordinarily not interested in unproven ideas. First, the Area Cooperation Office assembles a volunteer team of experts from local businesses and universities to review the idea. It is determined to be sound. Help is provided in drawing up a business plan. Local money sources are approached for furnishing the initial capital. Since there is substantial risk, the total amount required is spread among a large number of investors. Investors include all types of businesses, including banks, insurance companies, venture capitalists, larger industrial companies and labor unions, religious organizations and city and county organizations.

"The simplest, yet an important program is that of fostering the start-up of new, small enterprises."

Solar Energy: Another program that would be appropriate is the development of alternate sources of energy that will be of critical importance in the future.

Solar energy can be more decentralized than many other sources and hence is particularly applicable to agricultural needs.

The approach is to identify the projects with the best potential and then convene community leaders with top managements of appropriate companies to get them to undertake implementation. Where the risk is too high, or financial commitments are beyond the means of individual companies, then joint ventures should be encouraged – either by collaboration between existing companies or through the formation of new companies. For example, Battelle and Northwestern Mutual Life Insurance are engaged in a solar energy irrigation project.

Youth Employment: Reducing unemployment among disadvantaged young is another potential program. The present 40% rate, or higher, of unemployment among the minority young in most of our large cities is not only shameful to our society, but dangerous.

It is certain that dedicated and coordinated large-scale cooperation among business, government, academia and labor can make a vast improvement.

"Reducing unemployment among disadvantaged young is another potential program."

Urban Projects: Closely related to youth unemployment are a number of important urban projects that should be implemented to help revitalize inner-city areas and solve the nation's housing crisis.

The inexorably rising costs of transportation will reduce drastically the distances people can afford to commute daily. Hence, there will be incentives for locating industry amid existing housing.

Resolution of the nation's housing crisis will require a much expanded level of effort in the construction and maintenance of affordable housing.

Preservation of the existing urban stock of housing offers the greatest entrepreneurial opportunities and potential for job creation. This will require some reformation of the private housing marketplace, which is feasible.

CONCLUSION

Other programs could be cited, but the four described should be adequate to convey the essence of the approach.

The underpinning to this approach is a more cooperative stance by corporations, particularly the large ones. Essentially, this means making their technological, management and financial resources more available for the solution of societal problems.

Vast amounts of existing technologies are under-utilized and there is unplanned duplication of technological effort. What is proposed is that each company makes its technologies more available for non-competitive use and to engage in widespread cooperation through joint projects. And further, that each company look at society's problems as business opportunities to be pursued either entirely through company initiatives or through joint projects with other companies, universities and government.

"The underpinning to this approach is a more cooperative stance by corporations, particularly the large ones."

Legislative action will be required to encourage business through tax or other financial incentives to make technologies more available and for pursuing cooperative activities.

The program that is envisioned requires a level of social commitment from many different segments of our society that have not given much evidence of a willingness to do that in the past. But there is discernible change under way and it will accelerate through greater involvement.

The issue basically is, does business keep doing just what it wants to do or does it turn more toward meeting the needs of society?

In spite of steadily increasing contributions, improved ethical conduct, greater environmental concerns and sponsorship of economic education in recent years, the image of business hasn't improved materially. Hence, it is clear that it is not going to improve substantially until there is a much greater commitment by business to solving societal problems.

"The issue basically is, does business keep doing just what it wants to do or does it turn more toward meeting the needs of society?"

But business by itself can not solve the major problems, and even if it could, the desired image would not result. The other segments of society must help, and through their involvement learn how societal needs are met, where jobs originate and how difficult it is to create and maintain them. Only then will business be understood and appreciated and the unfriendly attitudes eliminated that are so prevalent in our society.

Therefore, the technologies for improving the image of business are the management, product and process technologies of business dedicated to the solution of major problems of society.

Technology for The Inner City- Experience & Promise

William C. Norris
Chairman and Chief Executive Officer
Control Data Corporation

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ED 120383

This address was given to the principals of Chicago United, a consortium of the leading black, white and Latino business leaders of Chicago, on September 1, 1978.

To have the opportunity to review with you Control Data's strategy, experiences, ongoing plans and perspectives relative to solving inner city problems is particularly pleasing. Because of your successes in training and creating employment for inner city disadvantaged and with other programs, I don't feel that I run the risk of losing my audience for lack of detail. Instead, I feel challenged to be able to move fast enough to cover all that needs to be said.

Control Data's strategy is to approach inner city and other societal problems with the objective that solutions can be turned into profitable business opportunities, with an appropriate sharing of cost between business and government. Where the resources for solving problems are beyond those of a single company, as most are, we try to pool them through cooperative projects or joint venture companies.

"Control Data's strategy is to approach inner city and other societal problems with the objective that solutions can be turned into profitable business opportunities..."

Control Data adopted this strategy some twelve years ago. It has been pursued vigorously and has proven sound. Although we undertake some social programs, because they are the "right thing to do", we view the major, unmet needs of society as opportunities to pursue profitable business. This is, after all, the basic reason for the existence of business.

The list of society's needs is long. It includes more and cheaper energy; rebuilding of cities; environmental protection; lower food costs; more available and less costly health care; lower cost, more available and higher quality education; better availability of technology, and – most important of all – more jobs, especially more skilled jobs.

Needs to be addressed by Control Data are selected on the basis of a number of criteria, including:

1. The importance of the need to society.
2. Control Data's capabilities to address it.
3. The likelihood that solutions will provide a business opportunity.

With that background in place, I will describe briefly some of our programs that either directly address inner city needs or are especially relevant.

INNER CITY PLANTS

First is our inner city plant program. We have successfully established new plants in three economically depressed areas, a fourth is under construction and construction of a fifth is about to be started. When the fifth is completed, total employment in those plants will reach 1500 persons.

We have succeeded in making our poverty area plants profitable at a level competitive with our conventional operations. At the same time we are serving the interests of each community and providing a path for disadvantaged persons to enter the mainstream of industry.

Planning for the first inner city plant began in 1967 during the time of rioting in the streets of Minneapolis. A site in a black poverty area on the north side of the city was tentatively selected and after many meetings with black leaders in that community and city officials to assure that we would have their support, we decided to proceed. The doors of the plant opened in January of 1968.

We are careful to observe a number of rules that bear heavily on the success of an inner city plant.

First, it is not philanthropy, but clearly a business venture that will return an attractive profit.

Second, the start-up cost is to be viewed in the same way business views research and development for a new product.

Thirdly, there is a total commitment to success that is widely visible, both inside and outside the company. To help assure this, the plant must be new and use the most advanced facilities; and it must make an important product, so that we are as dependent on the plant's success as the people working there. Similarly, first rate management is required.

"...the community has an equal contribution to make to the plant's business in the form of knowledge about the community, its people's problems, potential solutions."

Fourth, the community has an equal contribution to make to the plant's business in the form of knowledge about the community, its people's problems, potential solutions. Community leaders commit themselves to help assure success, and there are clearly established links between them and the company.

Finally, unusual problems are to be solved promptly, not kicked around. Last year the slogan of the Chicago Bears was "whatever it takes". It was this philosophy that drove our early efforts at north side and it is this philosophy that made the plant work.

And sometimes it took a lot. There were plenty of unusual problems in starting up that first plant. One was the opportunity for employees to obtain credit. We solved that by providing loans from our Commercial Credit subsidiary. Another was lack of day care for children, which resulted in absenteeism for mothers who needed to work. I'll talk about our solution to that shortly. People in that community, we found, experienced an unusual amount of legal hassle with landlords and stores, and Monday morning's production would suffer because part of the work force had landed in jail over the weekend. The

solution to that problem was twofold: establish a procedure whereby one of our young lawyers made a trip to the city jail early Monday morning with a book of bail bonds to get people back to work; the other action was to provide more extensive counseling and legal help to solve personal problems and accommodate to the requirements of full-time employment.

Another problem was that of our standard employment form which required a listing of work experience, educational background, references, and arrests and convictions. The average applicant had no experience, no useful references and for some there wasn't nearly enough space on the form to list all of the brushes with the law. The solution was to greatly simplify the form by eliminating those and other requirements so that in essence we were saying we are more interested in your future than in your past.

It cost $2.5 million to bring that plant up to the efficiency level of other plants. The government paid $1 million of that amount, and the $1.5 million that Control Data paid was regarded as the equivalent of research and development for a product. Considering that we now have an efficient production operation with average tenure at more than 5 years, and considering what we have learned, the pay off is a handsome one – comparable to product R&D.

NORTHSIDE CHILD DEVELOPMENT CENTER

At the time the northside plant began operation there were no child care facilities in the neighborhood. Also, many of the residents were female heads-of-households with young children. Clearly child care had to be provided if the most urgent employment needs were to be served. So we enlisted the support of the community and got a day care center started in a vacant eighty-year-old school building. One of the leaders in that effort was none other than Bob McGregor.

"...we enlisted the support of the community and got a day care center started in a vacant eighty-year-old school building."

In 1976, the center moved into a new building, specifically designed as a child development center. It was built with 90% private funds and loans from local firms.

The center provides care for more than 130 children, ages 6 weeks to 13 years. Trained personnel conduct a carefully designed program for enriched child development. The program encompasses personal management and social development, physical development, arts and crafts, sciences and black history and awareness. It is an A-One-plus center which I unabashedly proclaim as the finest, bar none.

Northside Child Development Center operates as a non-profit corporation controlled by a board of parents, business people and community leaders. Operating expenses are shared by several Minneapolis businesses, parent donations, local taxes and federal matching funds.

SELBY

While the child development center helped solve the problems of employment for some working mothers, we learned that there were many job seekers who could not meet working hour requirements. These included female heads of households with school-age children as well as high school, vocational and college students in need of income to stay in school or to supplement family income.

To address that problem, early in 1970, we decided to open a plant employing part-time workers to do electronic sub-assembly in the depressed Selby area of St. Paul. Soon after we started the operation, the computer industry suffered a downturn. Hence the need for Selby's products was reduced and the original plan had to be revised by converting the operation into one providing collating, shrink wrapping, round cornering, kit making, tab cutting, heat sealing, packing, wrapping, stitching, labeling, binding and mailing of publications to meet Control Data's internal needs as well as those of other businesses.

"The first shift is mostly made up of mothers of school aged children. The second shift is high school students."

In 1974, a new 15,000 square foot facility at 746 Selby Avenue, built mainly by minority contractors, was opened to accommodate the operation's growth. It was the first new industrial facility to build on a mile-long stretch of Selby's dilapidated commercial strip since a trolley-car power house was erected in 1889.

Selby employment level is at 160 persons. The first shift is mostly made up of mothers of school aged children. The second shift is high school students. The part-time work schedule allows these individuals the opportunity to be employed while meeting their other obligations. The operation has been so successful that it is being expanded and, with an addition to the plant now in process, will go up to 275 employees.

Using part-time workers in a conventional production environment has been proven sound and we are pushing for wider use of part-time workers at other Control Data operations.

Since Selby began, more than 150 employees have left their part-time jobs for more skilled and better paying, full-time employment at other Control Data facilities and Twin Cities companies.

One other aspect of Selby to mention is the catalytic effect it has had on getting revitalization started in the neighborhood. New businesses have opened up – homes are being renovated – and there is a substantial amount of new home building.

PLATO – COMPUTER-BASED EDUCATION

Basic to jobs, however, is education and training. Control Data's

largest program addresses the need for better, more available and lower cost education. Of course, the need for improvement in education is not just confined to the inner city but is nationwide and worldwide.

The only way to make major progress in solving this massive and urgent problem is through the use of advancing technology, such as television, audio/video tapes and satellite transmission coordinated in a network learning system with computer-based education.

Control Data has been engaged in developing PLATO® computer-based education and training for fifteen years. We see computer-based education and other advancing technologies as ultimately having a greater positive impact on inner city living than anything else.

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FAIR BREAK

PLATO computer-based education is central to Fair Break. A Control Data inner city program to prepare young, inner city disadvantaged unemployed persons to get and keep a job and to make jobs more available to them. Our first Fair Break center is now operating in St. Paul and delivering innovative training and employment to inner city youths. The youths will spend an average of four months in the program receiving training in basic skills, job readiness, life management, and job seeking. During the time the youth is involved in Fair Break, he or she will work part-time with Control Data or another firm – to create a source of income and to identify any problems which should be resolved before employment is sought out in the community. The program is being delivered in cooperation with the St. Paul city schools with funds from the St. Paul comprehensive employment and training program.

CAREER COUNSELING

In view of the enormous gap between the need for career counseling in high schools and the number of counselors (the latest ratio I saw was one counselor per thousand students) Control Data is developing a program for a December 1st launch date to address that problem with three existing resources; our employees, PLATO computer-based education and CYBERSEARCH.

Knowing that a substantial number of our employees welcome the opportunity to volunteer for counseling young people, we will provide them counseling training through PLATO which has the advantage that they can take the training at their convenience. We also believe that there are many other persons outside of Control Data who would

volunteer for counseling if given the opportunity. PLATO CB counseling training will be available at any of our 50 learning centers. Economically and practically it is only possible to make a massive increase in counseling resources with computer-based training.

CYBERSEARCH is a computer-based employment service that has a large data base of available jobs. This information at the finger tips of each counselor, is of course a key element in the most effective counseling.

ROSEBUD

An effort that will ultimately find important application in the inner city is our program to improve Indian health care on South Dakota's Rosebud Indian Reservation. Control Data has worked with tribal leaders to apply computer technology and managerial resources to dramatically improve health care delivery. Previously, one small hospital was responsible for the care of 8,500 native Americans. Those who required care had to travel up to 130 miles to get it and the number of professional staff was woefully inadequate to the task. Significant improvements have been evident since Control Data's medical van began traveling the reservation providing care to 900 residents per month. In addition, four clinics have been established and Indian paramedics have been trained. All this was accomplished with a front-end investment from Control Data's corporate social responsibility funds.

"...there is still urgent need for further improvement at Rosebud and even more at most other reservations where health care isn't only poor but is shamefully poor."

Even though substantial improvement has been made at Rosebud, there is still urgent need for further improvement at Rosebud and even more at most other reservations where health care isn't only poor but is shamefully poor.

The next phase of the program is to teach self health care to avoid illness through the use of PLATO computer-based education. This is a gargantuan task, but it is the only possible way to ever bring about the needed improvement in Indian health.

Control Data is committed to a large-scale effort to help bring about the necessary change in health care through training, not only for American Indians, but for all. And we have the dedication and we can marshal the resources of other companies and the government to ultimately achieve that goal.

TECHNOTEC

The development of solutions to society's problems is diminished when

proven technology is not replicated, and this has certainly been the case in urban efforts. The successful problem-solving technologies of one city or one neighborhood might never be applied in another setting. Control Data's TECHNOTEC service addresses this problem. It is a worldwide computer-based communications system for collecting and helping to transfer technology. Although all types of technology are stored in the data base, priority is placed on solar energy, agriculture, food processing and urban technology. In agriculture emphasis is placed on technology for small family farms, including urban farming, and small-scale food processing, because we believe that they offer the best means in the future to reduce food costs and increase production.

"A host of new technologies, such as lower cost energy sources and lower cost and energy-efficient construction are required for better inner city living."

A host of new technologies, such as lower cost energy sources and lower cost and energy-efficient construction are required for better inner city living. Many already exist and are being stored in TECHNOTEC. Easier access to needed technologies will be especially helpful to small enterprises which will play an important role in rebuilding neighborhoods and commercial centers and in providing many other services. Participation in small enterprises gives control to residents of the inner city and provides them the long-absent economic opportunity and incentives for success. And a revitalization process founded on diverse profitable enterprises rather than dependent upon a host of public programs will be a principal means of rebuilding a community which can become self-sufficient and responsive to changing needs from within.

BUSINESS AND TECHNOLOGY RESOURCE CENTERS

Because of the importance of small business in creating and maintaining a solid base for urban revitalization, a new program at Control Data focuses on facilitating small business formation and operation in the inner city through business and technology resource centers.

A business and technology resource center is a business engaged in providing various combinations of consulting, shared facilities and services for facilitating the successful start-up and growth of small businesses.

A cluster of buildings containing flexible laboratory and office space is subdivided and leased to small businesses. Also contained within the buildings are the centrally shared facilities and services including library, model shop, clean rooms, drafting, accounting, purchasing and legal services, and a complete range of computer services, including technology locating and transfer services and computer-based education.

Economies of scale will make it possible to provide occupants needed facilities and services of much higher quality for considerably lower cost than each one would be capable of providing alone. Benefits will also be obtained from the enhanced environment for peer interchange.

"...a new program at Control Data focuses on facilitating small business formation and operation in the inner city through business and technology resource centers."

It is intended that computer-based education will not only provide a wide range of courses, including management training, accounting and compliance with federal trade commission regulations, but also enhanced collaboration and technology interchange with universities and government laboratories.

A roster of professional consultants, including university faculty members, will be maintained.

There will be an important element of social service involved in that the professional consultants, both from business and academia, will provide a certain percentage of time free of charge in helping would-be entrepreneurs to prepare plans.

We are in the process of selecting four cities in which to place resource centers. Since Control Data by itself will not be able to meet the demand, we will arrange to franchise small-business persons to operate centers.

COMMUNITY COOPERATION OFFICE

Obviously, a business and technology resource center needs a high degree of community support in order to be successful. As with inner city plants, Control Data will not undertake a resource center without a commitment for full support by the community and an organized way of providing it. Support includes an appropriate piece of land at a reasonable price, CETA funds for training and seed money for new companies.

It is my belief that the most effective manner for a community to provide seed money is through the type of organization that Control Data and others are establishing in Minnesota. We call it a "Community Cooperation Office for Small Business".

It is a non-profit corporation that is supported by private contributions. The board of directors are leaders from all the major sectors of society – business, labor, church, government, academia non-profit, etc. The permanent staff is small and is supplemented with volunteers having the professional expertise that is required in the many different fields in which the small businesses will be engaged.

The modus operandi is simple. An inventor has an idea for a new product or service, and wants to start a company to develop and market it. Financial backing from the usual sources is not available; venture capitalists are usually not interested in unproven ideas.

The Community Cooperation Office provides assistance. A volunteer team of experts is assembled from local business and universities to review the idea, and if sound, to help in the preparation of a business plan and in the prompt completion of the many other steps in setting up a business. Since there is substantial risk, the initial capital is spread among a number of investors, including all types of businesses, banks, insurance companies, larger industrial companies, venture capitalists, plus labor unions, religious organizations and local civic and government units.

CITY VENTURE CORPORATION

Next I will briefly describe a consortium in which Control Data is participating along with a number of other companies with relevant experience and commitment to urban revitalization.

The consortium is called "City Venture Corporation" and it is being formed to:

(A) Plan and manage the implementation of innovative, comprehensive and constructive programs aimed at revitalizing existing urban areas and creating new innovative cities; and

(B) Assemble the full range of new and advancing technology (including that from both the physical and social sciences) necessary for the effective solution of urban problems.

The corporation will market its services to communities and to state and federal agencies and demonstrate that the building and rebuilding of American cities can be profitable enterprises.

"...there is no entity capable of planning, financing and implementing a holistic long-term solution to complex, urban problems."

Currently there is no entity capable of planning, financing and implementing a holistic long-term solution to complex, urban problems. There has been relatively little long-range urban planning and no risk taking with creative and experimental alternatives. Rather, the programs have been fragmented and crisis reactive.

The initiative must come from the business community. City Venture Corporation, representing a broad cross-section of relevant industries, will harness the needed technologies and resources and other resources and manage large-scale urban programs to achieve better urban living.

I am pleased to tell you that one of the most innovative architects of our time and a Chicagoan, Bertrand Goldberg, is one of the founding members.

STOCKHOLDER SUPPORT

There is much more that I could say about City Venture Corporation; however, I will use the remaining time to review stockholder reactions to Control Data's strategy which on balance is highly positive. The most recent information came from the results of the May stockholders meeting. Before describing them I need to provide further background.

From virtually day-one of Control Data's inner city plant program and thereafter, I have been meticulous in reporting plans and programs to stockholders. During the course of these programs Control Data has been confronted with severe problems which have had adverse impact on profitability even to the extent of causing a loss position for 1974. For most of the years Control Data paid no dividend to stockholders, and it wasn't until 1977 that the first cash dividend – a small one of 15¢ per share – was paid. It was increased to 25¢ in 1978.

"...one might conclude that under those circumstances stockholders would take a dim view of a strategy addressing social problems as business opportunities..."

Offhand, one might conclude that under those circumstances stockholders would take a dim view of a strategy addressing social problems as business opportunities, where the pay-off is often longer term and sometimes well into the future.

But that was not the reaction of the majority of individual stockholders. Sure, there was the occasional letter from a stockholder demanding that the company pay dividends with the money being used for the programs to help solve societal problems, or that the best thing that could happen to Control Data would be a takeover by another company who would then throw me out.

At the same time I received many more stockholder letters expressing approval of the programs and also wishing the company better times and hoping for a cash dividend down the road.

Even though there were more letters from stockholders who were supportive, I couldn't be sure of the position of the vast majority who were silent . . . at least not until last May when I believe the answer became clear.

In order to better protect the employees, stockholders and other stakeholders of Control Data from the injustices accompanying hostile takeovers, a proposal was submitted for the approval of stockholders to amend the company by-laws to make it mandatory that the directors consider all social factors, not just price, in an attempted takeover. The proxy stated that the result of such an amendment might strengthen the position of current management.

Over 95% of the individual stockholders of Control Data voted in favor. That to me is a clear endorsement of our strategy – otherwise they would not have been willing to give management more power of any kind.

This experience is consistent with those of a recent Gallup poll showing that 89% of the people in inner cities wanted to help solve inner city problems, both through contribution of personal time as well as money. As an aside, I want to add that those are people I particularly welcome as Control Data stockholders.

CONCLUSION

I will conclude with the observation that business has for too long been living in the past, preoccupied with doing things in the traditional way. Meanwhile, the world has changed. The problems and needs of the U.S. industrial society today are different from those of the 19th century or the first half of the 20th.

"Business needs to be reminded that the fundamental reason for its existence is to deliver the goods and services that society needs."

This is reflected in the growing controversy in recent years between the "social" responsibility of business and the "profit" responsibility of business. Business needs to be reminded that the fundamental reason for its existence is to deliver the goods and services that society needs. In our system, profits are essential to the continuation of business, but society may decide that the business system itself is not essential unless it becomes more responsive to society's real needs.

While business has been mainly ignoring the major problems of society, the government has demonstrated its inability to cope successfully with them alone so they are growing to disastrous proportions.

So it is time that business responds. And I believe that the experiences I have cited indicate that the average individual corporate stockholder will not only support response but encourage it. I also believe that the most stable, enduring and profitable business opportunities will result from such a strategy.

Thank you.